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1 JUL 1948

REPORT

ON THE

SANITARY ADMINISTRATION

OF THE

PUNJAB

FOR THE YEAR 1880.

Lahore:
PRINTED AT THE CENTRAL JAIL PRESS,
1882.

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REPORT

ON THE

SANITARY ADMINISTRATION

OF THE

PUNJAB

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Proceedings of the Hon'ble the Lieutenant-Governor of the Punjab in the Home Department (Medical and Sanitary,) No. 34, dated 10th January 1882.

READ—

Report by Surgeon-Major H. W. BELLEW, C.S.I., Sanitary Commissioner, Punjab, on the Sanitary Administration of the Province for the year 1880.

OBSERVATIONS.—The registration of births was for the first time carried out in all rural circles and towns of the province, and the success of the measure was better than was anticipated. The mean result was a birth-rate for the whole province of 31 per mille. The districts of Gujrat, Amritsar, Ferozepore and Lahore yielded rates varying from 40·8 to 45·5 per mille; the districts of the Peshawar Division shew the lowest rates, all being under 15· per mille. The number of births of boys registered was equal to 17·05 per mille of the total population, the births of girls giving a rate of 14·09 per mille; the proportion of births of the two sexes being 121 males to every 100 females. The number of deaths registered in the province during the year amounted to 472,731, giving a death-rate of 27· per mille of the population according to the census of 1868; the death-rates of 1878 and 1879 were 36 and 38 per mille respectively. The deaths in the two sexes were in the proportion of 124 deaths of males to every 100 deaths of females. But, though the registered mortality of 1880 was much less than that of the two previous years, it was considerably in excess of the average mortality of former years. Taking the monthly rates it would appear that April and July were the months of lowest mortality, the rate of both these months being but little over 20· per mille; the mortality was highest in the month of October, when it rose to 35· per mille.

Taking the rates of the several districts, Delhi is found to give the highest rate, 38· per mille; Kangra, Rawalpindi, Lahore and Shapur also all shew rates about 30 per mille; the districts of Jhang and Dera Ghazi Khan and the districts of the Peshawar Division give the lowest rates, all being under 20· per mille. The extremely low death-rates of these districts no doubt indicate very imperfect registration, but it is satisfactory that even in these districts improvement is now manifest.

2. The mean death-rate for the year of 52 municipal towns of the province was 32· per mille, or 5· per mille higher than the rate for the whole province. The table of death-rates of the several towns, however, exhibits differences as great as those noted in the district rates, the town of Batala in the Gurdaspur district shewing a death-rate of 13· per mille and Sirsa 17· per mille; while the rate of Lahore was 29·, Amritsar 39·, Delhi 41·, Peshawar 45·, Ferozepore 49·, and Rawalpindi the very high rate of 61· per mille.

3. The results of the special registration of births and deaths in the villages on the Western Jumna Canal are more favorable than in the previous year, the birth-rates being much higher, while the death-rates are considerably lower. The latter are, however, much in excess of the death-rates of the districts of Delhi and Karnal, in which the villages are situated.

4. The following figures shew the mortality from the more common causes during the year, compared with the mortality from the same causes in the previous year:—

	1879.	1880.
Cholera	26,135	274
Small-pox	49,489	9,145
Fevers	472,939	327,727
Bowel complaints	29,612	20,736
Injuries	5,306	5,557
Other causes	89,732	109,292
	673,213	472,731

5. The report for 1879 contained the record of the wide-spread epidemic of cholera which covered nearly the whole province. In the year 1880 cholera

occurred in an epidemic form only in the Peshawar district, where it appeared late in the year, the first outbreak occurring in August at Tangi, close to the northern border of the district. Of the 274 deaths from cholera registered among the general population of the province, 167 occurred in the Peshawar district. The epidemic was carried by troops and camp-followers into the district of Rawalpindi, and spread but little among the general population. Of 26 persons who died of cholera in this district in the months of September, October and November, 18 were camp-followers or other strangers, the remaining 8 being residents of the towns and villages on the trunk road at or near which the troops had encamped.

6. The origin of this outbreak of cholera in the Peshawar district is not very clearly accounted for. Dr. Taylor, who first visited Tangi, attributed it to importation from across the border. Dr. Bellew also apparently recognized this as one source of the outbreak. He appears, however to attribute the outbreak primarily to an influence which had advanced gradually through the province early in the year from the south-eastern districts in the route usually followed by epidemic cholera; and in support of this opinion he points to a number of isolated deaths from cholera reported from several districts of the province in the early months of the year. Isolated cases of cholera occurring in non-epidemic years are very important links in the history of cholera, and it is most desirable that all information obtainable regarding them should be recorded, especially evidence that they were genuine cases of cholera. Several similar cases were registered in the early months of 1879, but on special enquiries being made satisfactory evidence was furnished that in all these cases the entries were erroneous. Dr. Bellew gives no details regarding the cases which he cites as evidence of the advance of cholera from east to west in 1879, with the exception of the case of a traveller on the Grand Trunk Road in the Rawalpindi district which he describes as an indisputably genuine case; but, even supposing the other cases reported were equally genuine (and considering the great prevalence of cholera in the previous year, its appearance here and there might be expected), the evidence they afford of the spread of cholera in any definite direction is scarcely appreciable. The first case reported occurred in the western portion of the Umballa district on the 15th January, upwards of 200 miles from the south-eastern border of the province; the second and third in the Gurdaspur and Amritsar districts on the 1st and 4th February; the fourth on the 25th February in the eastern portion of the Umballa district; the fifth on the 2nd March (the case of the traveller on the Grand Trunk Road in the Rawalpindi district); the sixth, a second case in the Gurdaspur district. Up to this time not a case had occurred in the south-eastern districts, but on the 18th March a death was reported under the head of cholera in the Gurgaon district, and on the same date and on the 19th deaths from the same cause were reported in the Rohtak district. In April four or five deaths were reported from cholera in Lahore, and the occurrence of several similar cases subsequently on the Grand Trunk Road between Jhelum and Rawalpindi afford some slight evidence of the disease spreading westward; but, on the whole, when the locality of the first epidemic outbreak and the circumstances attending it are considered, the probability is in favor of its having been due to importation from beyond the western frontier.

7. Not only does Dr. Bellew found upon these isolated deaths from cholera an opinion that the outbreak in the Peshawar district was primarily due to an influence that came up from the eastward, but he also infers from their occurrence that this influence was continuously present throughout the year in those districts in which the cases occurred (paragraph 45 of the report). Allowing for the sake of argument that cholera may be primarily dependent on a peculiar influence pervading the atmosphere, and that the deaths reported from cholera were really such, the more natural inference from the latter remaining isolated would be, that the cholera influence was not generally present, in fact, that its absence constituted the difference as regards cholera between the season of 1880 and that of the previous year when cholera spread so widely over the country. This is a speculative point discussion of which would be out of place here were it not that the belief in the dependence of

cholera on some influence pervading the air leads Dr. Bellew to a conclusion which, if accepted, might induce laxity in carrying out those sanitary measures whereby we have hitherto hoped the visitations of cholera may be averted or mitigated. It is unfortunately true with respect to certain localities, as Dr. Bellew points out in paragraph 46 of his report, that our British soldiers (whose barracks have been so costly and so elaborately planned in their details for the preservation of health) continue to be liable to suffer from cholera, when it comes, more severely than the general population in their ill-ventilated and over-crowded hovels; but the legitimate deduction from this fact appears to be that over-crowding and insufficient ventilation, though undoubtedly detrimental to the general bodily health, are neither of them the special insanitary condition that determines the incidence of cholera on a community. The statistics of many of the stations of our troops and also of several native cities shew that sanitary measures have acted beneficially in reducing mortality from cholera; that they have included the removal partially or wholly of the special conditions by means of which a population is rendered liable to be visited by cholera; in other places this determining cause still exists. What is required is, that this cause shall be discovered and recognised in order that special measures may be directed towards its removal. The belief in an inevitable cholera influence pervading the air is not calculated to encourage progress towards this end, and before it can be accepted we need better evidence in its favor than the occurrence of a few deaths at wide intervals of time and space, and registered as deaths from cholera by uneducated natives.

8. With small-pox as with cholera a season of great epidemic violence was followed by one in which the disease was comparatively quiescent: only 9,145 deaths from this cause were registered in 1880 against 49,489 in the previous year. The disease was epidemic in a marked degree only in a few districts, chiefly the districts of Dera Ismail Khan, Bannu and Muzaffargarh. In many districts the presence of the infection among the people was indicated only by a few isolated deaths, widely scattered and occurring at considerable intervals of time. This was notably the case in the districts of Delhi, Gurgaon, Rohtak, Hissar and Sirsa. In the wide area formed by these five districts only 74 deaths from small-pox were reported in the course of the year, and these occurred in 56 villages scattered over 34 registration circles. The districts of the Amritsar Division exhibit an almost equal immunity from the epidemic.

Dr. Bellew's observations on the seasonal recurrence of small-pox, the regularity with which it attains its maximum of prevalence in the month of May and falls to its minimum in October, and the connection that apparently exists between the amount of rain-fall and epidemic prevalence, increased prevalence being coincident with diminution in the winter rains, are of much interest, and they confirm observations made in other parts of India that seasons of drought are favorable to the prevalence of small-pox.

9. The mortality from fever diminished greatly from the excessive mortality from this cause in the year 1879 and 1878, but was still much in excess of the average fever mortality of the previous ten years. The high figures that represent the mortality from this cause in the first four months of the year may be attributed in some measure to the after-effects of the severe fever of the previous autumn; but in April the health of the population improved and the mortality fell considerably. In May a rise in the fever mortality became evident, and continued through the month of June. In July, as usual, the minimum mortality of the year was reached, but, though lower than the minimum of the previous two years, it was considerably above the average minimum of former years. The higher mortality of the months of August and September which annually indicates the prevalence of the malarial fever of the autumn months was in 1880 less marked than usual, and the maximum mortality which was reached in October was considerably below the average of former years. The fever mortality of the hot weather was above the average; that of the autumn months below the average. The fall, however, in the mortality from the autumnal fever which usually takes place in December was very slight, and the fever mortality of this month was again above the average

10. Doctor Bellew continues the observations commenced in a former year with reference to the relation between the prevalence of fever and climatic changes. These observations are of great value, but the deductions drawn from them require to be checked or confirmed by the results of similar observations in other parts of India. So far as they go, Dr. Bellew's observations point to a very close relation between the seasonal variations in the climate and the health of the people, and no doubt the most important factor in this connection is the rain-fall. As regards fever, it would appear in the Punjab that, while the prevalence of the autumnal fever varies almost directly with the amount of rain-fall of the summer monsoon, the winter rains have but little effect in increasing the prevalence of fever; it is indeed very doubtful whether the rise in the mortality registered under the head of fever, which is annually observable in the statistics of the months of May and June, is in any degree an effect of the cold weather and spring rains; and when the great difference in the conditions of climate and soil are considered it seems scarcely probable that the fevers which cause mortality in the hot and dry seasons of the year are of the same character or can be due to the same causes as the fevers that prevail during and after the monsoon rains. A similar rise in the fever mortality is observable in the hottest and driest months of the year in parts of the country where the rains of the cold weather and spring are normally very slight, and their effect on the soil very transient. A corresponding fall in the fever mortality takes place when the excessive heat and dryness become modified by the approach of the monsoon, and over the greater part of India the first month of the rains is a period of low fever mortality: in the Punjab the month of July is commonly the healthiest month of the year. We require more accurate knowledge of the nature and causes of the fevers that occasion increased mortality in the hot months; but as regards the malaria of the autumn Dr. Bellew's observations confirm the opinion generaly held that it is developed in the soil under the combined action of solar heat and rain-fall, and that its prevalence is aggravated by excessive rain-fall or floods in localities where the drainage is insufficient to prevent the soil from becoming waterlogged. Dr. Bellew, however, shews that in classes of the people living under favorable circumstances the mortality from the autumnal fever is commonly slight, and that the great mortality which annually recurs during the months when the malarial influence is prevalent is in a great measure to be attributed to the low vitality which is induced by the unfavorable conditions under which a great portion of the people live, and by which they are rendered more susceptible to the action of the prevailing malaria and less able to resist the effects of climatic changes. The excessive development of malaria in certain localities may be obviated by special measures, but we must look to general improvement in the conditions and habits of the people for mitigation of the great mortality which now annually results from the autumnal prevalence of malaria.

11. The number of deaths registered under the head of "other causes," which includes the mortality from chest diseases, was considerably in excess of the mortality registered under the same heading in the previous year: the highest mortality under this head occurred in the first three and last months of the year.

12. In remarking on the deaths registered under the head of injuries the Sanitary Commissioner brings to notice the unusual number of deaths from suicide and accidental drowning that are reported year after year from the Gurgáon district. The Lieutenant-Governor desires to draw the attention of the Commissioner and Deputy Commissioner to this circumstance.

13. The report does not describe much accomplished under the head of sanitary works. The water-supply projects of Lahore and Simla were fairly advanced towards completion, and in both places it has been practicable to supply a large portion of the population with pure water. Progress has also been made in the drainage scheme for Amritsar. The proposed works for supplying Delhi with pure water have not yet been commenced. Schemes for the drainage of the town of Ludhiana and supplying it with water have

been proposed, and a proposal for improving the sanitary condition of Hissar has been submitted; but no definite action has been taken on either of these schemes. A project for the drainage and water-supply of Kohat is under consideration.

14. The Hon'ble the Lieutenant-Governor is glad to notice that vigorous action is being taken by the present Deputy Commissioner and the Municipal Committee for the improvement of the conservancy of the Lahore city, the sanitary defects of which were so prominently noticed by the Sanitary Commissioner in his inspection report of October 1880.

15. The reports from the municipal towns indicate considerable activity in sanitary matters. Nearly everywhere efforts are being made towards improving surface drainage, ensuring greater cleanliness of surface by providing latrines and improving conservancy arrangements. Some attempts are also made to improve the water-supply by cleansing and repairing old wells and constructing new ones; but the improvement effected in this direction is comparatively slight.

The expenditure on sanitary improvements from municipal funds amounted in the course of the year to Rs. 9,61,872, or nearly a lakh and three quarters more than was expended on similar works in the previous year.

The Sanitary Commissioner inspected a large number of the municipal towns, and when on tour devoted much time and labor in endeavouring to make the people understand the close relation that exists between the great sickness and mortality from which they annually suffer and the insanitary conditions which arise from their own ignorance and carelessness, and to how great an extent these conditions are capable of being removed and remedied by the exercise of a little care and thought and attention to common rules.

The acknowledgments of His Honor the Lieutenant-Governor are due to Dr. Bellew, Sanitary Commissioner, whose report contains much valuable information.

ORDER.—Ordered that the above remarks be printed and circulated for general information;

Also that the Review be published in the *Punjab Government Gazette.*

By order of the Hon'ble the Lieutenant-Governor, Punjab,

W. M. YOUNG,

Secretary to Government, Punjab.

Printed at the Punjab Government Civil Secretariat Press, Lahore.—17-1-82.—218.

No. 907S.

From

Surgeon-Major H. W. BELLEW, C. S. I.,
Sanitary Commissioner, Punjab,

To

W. M. YOUNG, Esquire,
Secretary to Government, Punjab.

Dated Simla, the 15*th August* 1881.

Sir,

I have the honor to forward herewith, for submission to His Honor the Lieutenant-Governor, my Sanitary Administration Report for the year 1880; and, with reference to my inspection report of Lahore, summarized on page 92 thereof, would beg to bring to the notice of the Lieutenant-Governor the very urgent need that exists for putting the sewerage and scavenging of that great city and provincial capital upon a wholesome and efficient footing. In the present condition of its street drains and gutters, Lahore is about the most filthy city in the Province, and it is high time that its existing very insanitary condition should be seriously taken up by the Municipal Committee without loss of time, with the determination to remedy the sanitary defects which have been repeatedly brought to notice by this office. The simple provision of side gutters in the several streets will at once remove much of the causes of complaint, and very greatly facilitate the work of scavenging. I would most strongly press upon the notice of Government the advantages to be derived by this simple, inexpensive, quickly laid down, and immediately efficient method of getting out of the city area the sewage matters which now soak into its soil very largely, and poison its atmosphere to a dangerous extent.

2. Since this Report was sent to Press, I have received the Annual Report of the Simla Municipality for the year 1880. As stated in the Report, "the conservancy arrangements of Simla as reorganized in 1878-79 continue to receive very strict attention, and are working well." The provision of 28 latrines in the native quarters, and also of privies in private compounds on a standard plan, whenever they could be constructed, has, as reported, very much improved the station in point of general cleanliness. The use of charcoal-dust and grit as a deodorant on privy floors, as recommended by this office, "has been found of great service." Altogether the improvement in Simla conservancy is very marked and satisfactory—and at a total cost of Rs. 19,409, or Rs. 1,346 less than in preceding year. I would invite attention to Major Nisbet's remarks on the new water-supply of the station, paragraphs 53 to 59 of his Report, and to recommend that the reservoir at Sanjaoli be completed at an early date, so as to render the water-supply of the station efficient.

3. In conclusion, I have to record the satisfactory discharge of their several duties by the members of my office establishment. They have one and all worked to my entire satisfaction. The head clerk, Mr. W. D'Rozario, and the 2nd clerk, Lala Káshi Rám, have conducted the work of the office with zeal and energy. Mr. A. Lincoln, the 3rd clerk, has performed his duties in a creditable manner. The head muharrir, Lala Sundar Das, and the head assistant in the English statistical branch of the office, Mián Abdul Ghafúr, have rendered useful aid in the respective duties allotted to them; and all the other clerks have worked willingly and well.

I have, &c.,

H. W. BELLEW,
Sanitary Commissioner, Punjab.

SECTION I.—METEOROLOGY.

No Remarks.

(*Omitted from the Report, vide Government of India No.* 9—258, *dated* 4*th September* 1878, *to address of Secretary to Government Punjab*).

SECTION II.—EUROPEAN ARMY.

No Remarks.

SECTION III.—NATIVE ARMY.

No Remarks.

SECTION IV.—JAILS.

No Remarks.

(*Vide Remarks on Section I*).

SECTION V.—VITAL STATISTICS.

BIRTH REGISTRATION.

Introduction of birth registration in all the districts of the Province, the chief event of importance during the year.

1. The chief event of importance under this Section of the Report has been the extension of the system of birth registration in all the districts of the Province from the beginning of the year under review. The procedure adopted for registering the same is detailed in paras. 19 and 20 of my Sanitary Report for the past year; I have now only to remark upon the results achieved by the system during the first year of its operation.

The total number of births registered in the Province.

2. The total number of births registered in the entire Province was 544,659, of which number 298,229 were boys, and 246,430 girls. The proportion of boys to girls was 17·05 to 14·09, so for every 100 female births there are 121 male.

The results shewn in statement giving the number of births registered by months, with the birth-rates, in each district of the Province, very satisfactory.

3. Table I shews the number of births registered by months, with the annual birth-rates, in each district of the Province during the year 1880.

Births registered in the districts of the Punjab, during each month of the year 1880.

Number.	Districts.		Population, (census 1868.)	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.	Ratio of births per 1,000 of population.
1	Delhi	...	608,850	1,325	1,352	1,356	696	420	491	607	1,549	2,084	3,626	3,130	2,498	19,134	31·43
2	Gurgaon	...	696,646	1.109	966	994	390	321	259	380	736	1,926	2,317	2,801	2,868	15,067	21·63
3	Karnál	...	610,927	1,082	1,287	1,476	698	781	764	957	1,569	2,417	2,386	2,566	3,084	19,067	31·21
4	Hissar	...	484,681	346	943	1,211	676	834	807	829	1,336	2,304	2,209	2,138	2,276	15.909	32·82
5	Rohtak	...	536,959	1,078	908	1,056	436	446	387	537	1,001	2,229	2,884	2,700	2,626	16,288	30·33
6	Sirsa	...	210,795	447	435	620	412	461	417	536	898	787	1,147	911	745	7,816	37·08
7	Umballa	...	1,008,860	1,422	2,058	3,111	1,409	1,742	1,236	1,273	2,160	3,445	3,309	3,334	3,834	28,333	28·08
8	Ludhiána	...	583,245	1,229	1,476	2,008	1,307	1,232	1,398	1,195	1,382	2,301	2,109	2,649	1,938	20,224	34·67
9	Simla	...	33,594	28	38	31	15	35	29	29	39	42	27	35	48	396	11·79
10	Jullundur	...	783,020	2,106	2,321	3,228	1,251	2,189	1,982	1,886	1,802	2,550	2,437	2,583	2,869	27,204	34·74
11	Hoshiárpur	...	938,890	1,736	1,892	2,267	1,436	1,591	1,780	1,289	1,844	3,320	3,027	3,774	2,885	26,841	28·59
12	Kángra	...	743,758	936	900	1,335	755	1,033	1,113	912	1,280	1,862	1,374	1,503	1,744	14,747	19·83
13	Amritsar	...	832,750	1,476	2,341	2,775	1,129	2,492	2,674	2,426	2,832	4,167	3,795	3,615	4,354	34,076	40·92
14	Gurdáspur	...	906,126	1,201	1,888	2,430	1,387	1,707	1,304	1,507	2,740	2,673	3,635	2,846	3,148	26,366	29·10
15	Siálkot	...	994,458	1,603	2,311	3,827	1,916	2,777	2,783	2,982	4,088	3,501	4,135	3,250	3,540	36,713	36·92
16	Lahore	...	775,551	2,037	2.624	3,378	1,984	2,567	2,316	2,673	3,751	3,402	4,042	3,319	3,231	35,324	45·55
17	Gujránwála	...	550,576	1,126	1,283	2,075	880	1,737	1,940	1,672	1,767	2.235	1,885	2,064	2,390	21,054	38·24
18	Ferozepore	...	533,416	991	1,372	2,313	1,041	1,495	1,608	1,659	1,782	2,667	3,081	2,445	2,601	23,055	43·22
19	Rawalpindi	...	699,647	670	1,183	1,562	1,073	1,103	850	844	1,560	1,549	2,457	2,158	2,537	17,546	25·08
20	Jhelum	...	500,988	634	1,252	1,596	642	1,199	1,264	1,315	1,487	1,741	1,438	1,568	1.958	16,094	32·12
21	Gujrat	...	616,347	1,065	2,227	2.699	1,220	2,025	2,141	1,965	2,121	2,748	2,223	2,270	2,468	25,172	40·84
22	Shahpur	...	368,796	817	993	1,266	590	1,113	1,352	1,345	1,329	1,638	1,314	1,230	1,529	14,516	39·36
23	Mooltan	...	459,765	842	825	1,250	719	1,255	1,497	1,350	1,432	1,779	1,389	1,397	1,610	15,345	33·37
24	Jhang	...	348,027	358	571	1.108	620	653	1,055	1,059	1,087	1,305	916	1,201	1,062	10,995	31·59
25	Montgomery	...	359,437	498	768	1,031	518	904	1,067	836	1,018	1,351	1,227	1,159	1,328	11,705	32·56
26	Muzaffargarh	...	295,547	371	533	761	589	748	724	954	1,211	1,164	1,372	1,022	1,037	10,486	35·48
27	Dera Ismail Khan	...	394,864	487	448	632	354	405	930	1,070	992	1,312	936	1,142	658	9,366	23·72
28	Dera Gházi Khan	...	309,978	322	429	587	307	492	790	834	890	1,129	733	697	760	7,970	25·71
29	Bannu	...	287,547	292	432	713	369	510	481	470	693	511	700	525	569	6,265	21·79
30	Pesháwar	...	500,443	399	374	468	263	199	256	213	262	374	440	608	522	4,378	8·75
31	Hazára	...	367,218	191	253	323	266	589	432	268	323	520	557	664	1,014	5,400	14·70
32	Kohát	...	145,419	84	136	115	67	126	148	150	120	204	189	212	256	1,807	12·43
	TOTAL	...	17,487,125	28,308	36,819	49,602	25,415	35,181	36,275	36,022	47,081	61,237	63,316	61,516	63,887	544,659	31·15

Of the 32 districts those in which the rate was highest are, Lahore 45·55, Ferozepore 43·22, Amritsar 40·92, and Gujrat 40·84 ; those in which it was lowest are the 3 frontier districts of the Pesháwar Division, namely, Pesháwar 8·75, Kohát 12·43, Hazára 14·70, and the two hill districts of Simla and Kángra with 11·79 and 19·83 as their respective birth-rates; with respect to the remaining 23 districts, 15 shew a birth-rate of over 30 to under 40, and 8 from over 20 to under 30 per mille of population; of these last mentioned, however, 5 shew a birth-rate of over 25. These results on the whole are highly satisfactory (especially when it is remembered that the system has been only one year in force), and serve to show that the registration of births has been readily accepted by the people. It will also be seen from the table given above, that the maximum number of births occurred in the month of December, and the minimum in April. The rise and fall in the number of children born during each month of the year is very interesting. In January the number registered was 28,308, in February it rose to 36,819, and in March to 49,602. In April it suddenly declined to 25,415, and rose again in May to 35,181. From this month to the end of the year the number continued to increase, and was as follows :—In June, July and August it was 36,275, 36,022, and 47,081 respectively; in September and October, 61,387 and 63,316; in November it was 61,516, and in December it attained its maximum of 63,887.

The cold weather months shew the highest number of births.

4. Thus it will be seen that in the Punjab, the highest number of births occur in the cold weather months. It is curious, however, that only 28,308 births should have occurred in the month of January, when no less than 63,887 occurred in December; but the causes for this difference are easily explained.

January was the first month in which the system of birth registration had to be organized, matured, and worked out, and besides this, the Memorandum Books, in which the chowkídárs were to record the births, instead of being in the possession of each chowkídár on or before the 1st January, were not distributed in some districts till after the first week of that month, so that the omission of the registration of a great number of births may be attributed to this cause. The delay, however, in supplying these books to Deputy Commissioners was unavoidable, as the order for printing 60,000 copies of the same was only received from Government in the middle of October 1879, and although the Central Jail Press, in which this work was ordered to be executed, did its utmost, yet it was unable to print all off before the middle of December.

DEATH REGISTRATION.

1880 a very healthy year.

5. The year under report compared with the two previous years was very healthy, no epidemic disease having prevailed to high proportions in any part of the Province. The total number of deaths registered was 472,731, or 27 per mille of population, of which the male deaths number 262,178 and female 210,553. The death-rate of males was 27, and of females 26 per 1,000 of population; the mean ratio for each respectively during the previous five years being 30 and 29. These rates are calculated on the mortality registered among the sexes separately, which, according to the census of 1868, shewed 1,532,679 males in excess of females. Had the sexes been equal in numbers, the difference between their death-rates would have been in the proportion of 30 males to 24 females, or 20 per cent. less than the male deaths. The proportion of male to every 100 female deaths was 124, the usual *average* rate in the Punjab since 1868, the corresponding rate in England being 107.

The deaths according to the principal diseases compared with the previous 12 years.

6. Of the total mortality registered in 1880, 274 deaths are reported to be due to cholera against 26,135 of the epidemic outbreak of the disease in the previous year; 9,145 to small-pox, which is the lowest number ever yet registered from this disease since the introduction of the registration system in 1868, and shews a very complete subsidence of the epidemic activity of the disease during the two previous years, when the number of deaths registered from this cause rose to 40,271 in 1878 and 49,489 in 1879, against 12,296 in 1877 and 10,254 in 1876, which last was the next lowest mortality from this disease registered in any year since 1868; 327,727 to fevers, a number which is considerably below that registered in the two past years of general epidemic sickness; and 20,736 to bowel complaints, which is also a considerable decline from the figures of 1878 and 1879. The remaining 114,849 deaths have been classified under the head of "all other causes" and shew a marked increase over the figures of the preceding year, though they are somewhat less than those of 1878. A detailed account of the prevelance and fatality of these principal death causes is given in the next Section of this Report, namely, Section VI "Chief Diseases."

The annexed table shews the total mortality of the Province with the death-rate per mille of population from the principal death causes from 1868 to 1880 inclusive.

Table shewing the mortality from different causes in the Punjab during the 13 *years from* 1868 *to* 1880 *inclusive.*

Year.	Cholera.	Small-pox.	Fevers.	Bowel complaints.	All other causes.	Total.	Death-rate per mille of population.
1868 ...	532	24,222	151,337	17,823	73,871	267,785	15
1869 ...	9,258	53,169	272,946	30,953	87,495	453,821	26
1870 ...	469	27,163	275,093	27,249	88,952	418,926	24
1871 ...	369	25,534	213,548	21,678	102,249	363,378	21
1872 ...	8,727	23,728	264,711	23.345	110,097	430,608	25
1873 ...	148	25,699	219,909	19,640	91,757	357,153	20
1874 ...	78	12,026	190,631	16,407	97.571	316,713	18
1875 ...	6.246	13,594	279,841	27,550	119,977	447,208	26
1876 ...	5,736	10,254	351,286	27,271	102,297	496,844	28
1877 ...	29	12,296	219,281	17,664	101,662	350,932	20
1878 ...	215	40,271	440,492	32,071	115,722	628,771	36
1879 ...	26,135	49,489	472,939	29,612	95,038	673,213	38
1880 ...	274	9,145	327,727	20,736	114,849	472,731	27

It will be observed from the above statement that the rate of mortality in 1880, while it is below that of 1878 and 1879 (the two exceptionally unhealthy years) by 9 and 11 per mille respectively, is 5 per 1,000 above the annual average of the other years of the series above recorded. A great portion of this increase is due, no doubt, to improved registration, as is explained further on, but a good deal also is to be attributed to the after effects of the two preceding years of unusual distress and sickness.

The mortality per mille ratio and the death-rate of each district of the Province.

7. The mortality during each month of the year 1880, with the monthly ratio per 1,000 of population, is shewn in the margin. The most healthy months were April and July with a death-rate of only 20 per mille ; and the most unhealthy that of October, with a death-rate of 35 ; September, November, December and January, also were unhealthy, but these are the months in which the autumnal fevers prevail, and the rise in the mortality need therefore excite no surprise. Compared, however, with the numbers in the two previous years (1878 and 1879) there is a very marked diminution under this head, which, no doubt, is due to the scanty rainfall and to the excessive dryness of the atmosphere, coupled with cheaper rates of food. The death-rates in the 32 districts of the Province range from 16 to 38 per 1,000 of population. For the sake of comparison I give herewith in juxta-position those districts which shew a death-rate of 25 per mille (the standard rate) and over, with those which shew a rate below that figure—

	Total deaths.	*Death-rate.*
January ...	47,192	32
February ...	36,045	25
March ...	33,083	23
April ...	29,384	20
May ...	35,162	24
June ...	36,708	25
July ...	29,277	20
August ...	35,989	25
September	46,868	32
October ...	50,714	35
November	46,008	31
December...	46,301	32

1.	Delhi		21.	Gurgaon	23
2.	Karnál	38	22.	Hissar	20
3.	Rohtak	27	23.	Sirsa	22
4.	Umballa	30	24.	Simla	24
5.	Ludhiána	26	25.	Siálkot	23
6.	Jullundur	25	26.	Ferozepore	23
7.	Hoshiárpur	28	27.	Jhang	19
8.	Kángra	34	28.	Montgomery	20
9.	Amritsar	29	29.	Dera Ghâzi Khan	18
10.	Gurdáspur	28	30.	Peshâwar	18
11.	Lahore	31	31.	Hazára	16
12.	Gujránwála	27	32.	Kohát	18
13.	Rawal pindi	32			
14.	Jhelum	28			
15.	Gujrat	30			
16.	Shahpur	31			
17.	Mooltan	25			
18.	Muzaffargarh	29			
19.	Dera Ismail Khan	26			
20.	Bannu	27			

Improvement in death registration in Jhang district noticed, and in the Province generally.

8. In 20 districts the death-rate was between 25 and 38, and in 12 only it ranged from 16 to 24 per 1,000. Of these last, 7 had a death-rate of 20 and under 25 ; and 5, namely, the 4 frontier districts of Dera Ghâzi Khan, Peshâwar, Hazára, and Kohát, and that of Jhang in the Mooltan Division, between 16 and 19. These results give a satisfactory index of the health of the population in the several districts of the Province, and also point very favorably to the improvement in the registration of deaths in the districts above mentioned ; in Jhang particularly, where I have, in previous reports, had to draw attention to the neglect of death registration. This improvement in registration in the Jhang district is mainly owing to the active interest and supervision exercised by the Civil Surgeon, Rai Bahadur Chetan Shah ; whilst for the Province generally it is due chiefly to the new system of recording births and deaths in the chowkídárs' Memorandum Books referred to in para. 1 of this report. This marked improvement will be better observed from the annexed table, where the death-rate of 1880 is contrasted with those in the previous 12 years (1868 to 1879). The figures of 1880 compare favorably with all those given in the above statement, with the exception of 1876, 1878 and 1879, the years in which there was abnormal sickness due to the prevalence of epidemic fevers and small-pox; whilst in the year under review as well as in those from 1868 to 1877 (omitting of course 1876), the mortality from these two causes was not so appalling and widespread.

The population and area, with the average population per square mile, is also given in the statement in order to shew those districts where registration of births and deaths, owing to the scattered condition of the population, (a point which must be taken into consideration) cannot be so effectively carried out as in those districts in which such a condition does not exist.

Annual death-rate in each district of the Punjab from 1868 *to* 1880.

Number.	DISTRICTS.	Population. (census 1868.)	Area in square miles.	Average population per square mile.	1868.	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.
1	Delhi ...	608,850	1,258	496	20	30	31	29	32	36	30	30	24	26	55	71	34
2	Gurgaon ...	696,646	1,938	348	15	30	19	20	23	18	15	27	20	19	68	81	23
3	Karnál ...	610,927	2,396	264	13	22	24	21	22	18	20	21	21	21	44	59	38
4	Hissar ...	484,681	3,540	137	9	24	15	19	16	12	16	18	12	12	25	42	20
5	Rohtak ...	536,959	1,811	295	9	23	18	18	15	15	21	22	17	18	37	67	27
6	Sirsa ...	210,795	3,116	68	16	28	16	15	21	14	18	23	18	16	27	40	22
7	Umballa ...	1 008,860	2,570	394	11	20	22	24	23	17	20	22	27	16	29	42	30
8	Ludhiána ...	583,245	1,375	429	23	26	33	19	28	16	19	26	28	22	45	34	26
9	Simla ...	33,594	18	1,888	10	16	14	12	13	14	12	22	18	15	21	30	24
10	Jullundur ...	783,020	1,322	596	23	31	31	26	30	25	22	32	58	24	72	34	25
11	Hoshiárpur ...	938,890	2,180	450	24	37	32	25	30	24	20	39	50	22	38	38	28
12	Kángra ...	743,758	8,389	87	22	29	21	18	24	19	17	26	25	20	22	32	34
13	Amritsar ...	832,750	1,573	535	18	38	21	19	28	28	22	37	41	26	45	43	29
14	Gurdáspur ...	906.126	1,822	496	22	36	29	23	29	23	17	42	35	21	29	35	28
15	Siálkot ...	994.458	1,958	510	24	28	38	26	31	26	17	28	40	17	23	23	23
16	Lahore ...	775,551	3,648	218	16	30	21	20	36	31	23	31	35	27	46	41	31
17	Gujránwála ...	550,576	2,587	207	9	13	14	15	23	19	13	23	43	24	34	34	27
18	Ferozepore ...	533,416	2,744	204	11	20	20	15	20	18	16	18	24	16	43	26	23
19	Rawalpindi ...	699,647	6,218	114	11	27	26	23	18	17	16	20	19	21	37	67	32
20	Jhelum ...	500,988	3,910	128	18	28	31	28	29	22	18	22	19	20	29	43	28
21	Gujrat ...	616,347	1,973	324	14	18	22	15	15	18	12	18	22	18	29	31	30
22	Shahpur ...	368.796	4,691	78	18	20	29	28	39	26	23	24	23	22	30	29	31
23	Mooltan ...	459,765	5,880	80	10	19	23	23	24	19	22	28	30	25	28	20	25
24	Jhang ...	348.027	5,702	61	9	16	18	13	17	18	14	18	16	13	12	13	19
25	Montgomery ...	359,437	5,574	64	19	32	19	19	25	22	18	31	23	21	30	21	20
26	Muzaffargarh ...	295,547	3.136	98	9	22	22	19	22	15	16	18	24	24	31	24	29
27	Dera Ismail Khan ...	394,864	9,296	56	9	20	24	25	30	20	17	16	19	20	27	22	26
28	Dera Gházi Khan ...	309.978	4,377	118	7	13	16	11	12	9	12	13	17	14	18	14	18
29	Bannu ...	287,547	3,831	91	9	18	21	21	20	13	13	12	19	18	21	23	27
30	Pesháwar ...	500,443	2.504	271	5	18	11	9	15	12	8	13	14	11	26	24	18
31	Hazára ...	367.218	2,835	122	9	21	18	15	12	11	14	16	17	13	25	24	16
32	Kohát ...	145,419	2,838	52	5	16	11	10	15	7	8	9	10	8	11	20	18
	TOTAL ...	17,487,125	107,010	173	15	26	24	21	25	20	18	25	28	20	36	38	27

Delhi.
Karnál.
Hissar.
Rohtak.
Umballa.
Ludhiána.
Kángra.
Lahore.
Gujránwála.
Rawalpindi.
Gujrat.
Shahpur.
Muzaffargarh.
Dera Ismail Khan.

An analysis of this statement will shew that there has been a satisfactory and progressive improvement in the registration of deaths in all the districts of the Province since 1868, notably in those given in the margin.

Defective registration in some districts due to an inefficiently supervised agency.

9. In those districts, particularly those on the frontier, in which the improvement is not so manifest, and in which registration may be reckoned to be still defective, I attribute the reasons, 1st, to the sparseness of the population, and 2nd, as stated in my letter to the Secretary to Government, Punjab, No. 440, dated 9th March 1881, (which is a reply to certain suggestions made by the Indian Famine Commission to make the registration of Vital Statistics more effective), " not so much to the unwillingness on the part of the people to submit to registration, as to the shortcomings of an illiterate and inefficiently supervised agency. For the chowkídárs, to whom has been entrusted the work of registering births and deaths, have hitherto been under no real supervision. "

Suggestions for providing systematic supervision of the work performed by the chowkídárs.

10. In the reorganization scheme, amalgamating the Vaccination with the Sanitary Department which is now under the consideration of the Local Government, I have made the following suggestions with a view to provide a systematic supervision of this agency in rural circles, and to make registration more effective and trustworthy.

Rules defining the duties of a Deputy Sanitary Commissioner.

"The improvement of birth and death registration in all parts of his circle will be an important duty of a Deputy Sanitary Commissioner. He will, as often as possible, examine the village chowkídárs' Memorandum books of births and deaths and verify the entries by enquiry on the spot. He will also examine the birth and death registers and returns kept at the Police and Municipal offices in all parts of his circle, he will note the condition of the registers and returns, the correctness or otherwise of the entries and total additions, and the probable amount of attention given to registration, and will record the results of each examination in the Police station visitors' book, or the Municipal Secretary's Minute book, for the information of the Superintendent of Police, or the Municipal Committee as the case may be."

Rules defining the duties of Civil Surgeons.

Rule III.—"The improvement of birth and death registration of both urban and rural circles in his district, will be an important duty of the Civil Surgeon. And with that end in view, he will examine the village chowkídárs' Memorandum books of births and deaths and verify the entries by investigation on the spot. He will also examine the birth and death registers and returns kept at the Police and Municipal offices; he will note the condition of the registers and returns, the correctness or otherwise of the entries and total additions, and the probable amount of attention given to registration, and will record the results of each examination in the police station visitors' book or Municipal Secretary's Minute book for the information of the Superintendent of Police or Municipal Committee, as the case may be."

Duties to be performed by district vaccinators.

* * * * * * "In the non-vaccinating season the vaccinators will be employed on sanitary work under the guidance of the Civil Surgeons in communication always with the Deputy Commissioner. For this purpose it will be the duty of the Civil Surgeon to train the staff of vaccinators under his orders in the elementary principles of general sanitation and hygiene, so as to qualify them for employment as aids in sanitary work. On this duty the vaccinators may be advantageously employed to assist the Civil Surgeon in the improvement of Vital Statistics in rural circles. They may be employed to examine the village chowkídárs' Memorandum Books of births and deaths, to verify the entries by investigation on the spot, and in each instance to report the results of examination to the Civil Surgeon."

Deaths according to age. One-half of the mortality occurred among children and the advanced ages.

11. From Annual Statement No. IV shewing the deaths registered according to age in the districts of the Punjab during the year 1880, the Provincial total of which, by different ages, is shewn in the margin for facility of reference, it will be seen that more than one-half of the total mortality registered during the year occurred among children under 6 years of age, and in old people aged 60 and upwards. The extent, however, to which the provincial death-rate is increased by the high rate of mortality that prevails among children, and at the advanced ages, will be seen from the annexed table shewing the annual rate of mortality per mille of population according to the different ages from 1877, the year from which the present classification in the age return was introduced in the annual returns of this department, to 1880.

	Males.	*Females.*
Under 1 year ...	55,081	46,738
1 year and under 6 ...	41,557	36,432
6 years and under 12 ...	12,996	11,075
12 years and under 20 ...	10,113	8,164
20 years and under 30 ...	18,645	16,319
30 years and under 40 ..	20,532	16,578
40 years and under 50 ...	26,231	18,370
50 years and under 60 ...	25,372	16,246
60 years and upwards ...	51,651	40,631
Total ...	262,178	210,553

Year.	Under 1 year.	1 year to 6 years.	6 years to 12 years.	12 years to 20 years.	20 years to 30 years.	30 years to 40 years.	40 years to 50 years.	50 years to 60 years.	60 years and upwards.
1877 ...	4·28	3·59	0·88	0·72	1·30	1·36	1·74	1·59	4·60
1878 ...	6·30	7·71	1·90	1·26	2·22	2·41	3·04	3·02	8·09
1879 ...	4·26	7·63	2·54	1·74	3·02	3·20	3·89	3·61	8·61
1880 ...	5·82	4·46	1·38	1·04	2·00	2·12	2·55	2·38	5·28

An analysis of the quarterly birth and death returns already published in the *Punjab Government Gazette.*

12. The following statement embraces the particulars relating to births and deaths registered in the towns and rural circles in each district of the Province summarised from the quarterly reports already submitted to Government, and published in the *Punjab Gazette.*

Comparative Statement of births and deaths registered during the year 1880.

Number	DISTRICTS.	*Population.*			*Births registered during the year* 1880.			*Deaths registered during the year* 1880.			*Births ratio.*			*Deaths ratio.*		
		Towns.	Rural Circles.	Total District.	Towns.	Rural Circles.	Total District.	Towns.	Rural Circles.	Total District.	Towns.	Rural Circles.	Total District.	Towns.	Rural Circles.	Total District.
1	Delhi ..	192,753	416,097	608,850	7,053	12,081	19,134	6,983	13,565	20,548	36	29	31	36	33	34
2	Gurgaon ...	75,877	620,769	696,646	2,096	12,971	15,067	2,297	14,074	16,371	28	21	22	30	23	23
3	Karnál ...	74,796	556,131	610,927	1,920	17,147	19,067	2,614	20,605	23,219	26	32	31	35	38	38
4	Hissar ...	69,241	415,440	484,681	2,206	13,703	15,909	1,602	8,255	9,857	31	33	33	23	20	20
5	Rohtak ...	55,263	481,696	536,959	1,566	14,722	16,288	1,668	12,925	14,593	28	30	30	30	27	27
6	Sirsa ...	28,097	182,698	210,795	774	7,042	7,816	637	3,975	4,612	27	38	37	23	22	22
7	Umballa ...	103,811	905,049	1,008,860	2,764	25,569	28,333	2,897	27,526	30,423	27	38	28	28	30	30
8	Ludhiána ...	77,911	505,334	583,245	3,438	16,786	20,224	2,788	12,615	15,403	44	33	35	36	25	26
9	Simla ...	17,440	16,154	33,594	77	319	396	286	511	797	4	20	12	16	32	24
10	Jullundur ..	125,957	657,063	783,020	3,627	23,577	27,204	3,107	16,648	19,755	29	36	35	25	25	25
11	Hoshiárpur ...	80,069	858,821	938,890	2,289	24,552	26,841	2,513	23,995	26,508	28	28	28	31	28	28
12	Kangra ...	26.614	717,144	743,758	563	14,184	14,747	1,173	24,099	25,272	21	20	20	44	34	34
13	Amritsar ...	169,770	662,980	832,750	6,667	27,409	34,076	5,884	18,030	23,914	39	41	41	35	27	29
14	Gurdaspur ...	89,622	816,504	906,126	2,579	23,787	26,366	2,352	22,821	25,173	29	29	29	26	28	28
15	Siálkot ..	71,941	922,517	994,458	3,129	33,584	36,713	1,587	20,998	22,585	43	36	37	22	23	23
16	Lahore ...	171,600	603,951	775,551	5,556	29,768	35,324	5,075	18.959	24,034	32	49	45	29	31	31
17	Gujránwála ..	70,633	479,943	550,576	2,405	18,649	21,054	1,847	13,008	14,855	34	39	38	26	27	27
18	Ferozepore ...	28,802	504,614	533,416	1,439	21,616	23,055	1,118	11,260	12,378	50	43	43	39	22	23
19	Rawalpindi ...	52,379	647,268	699,647	1,424	16,122	17,546	2,024	20,515	22,539	27	25	25	39	32	32
20	Jhelum ...	38,049	462,939	500,988	1,003	15,091	16,094	993	13,071	14,064	26	33	32	26	28	28
21	Gujrat ...	41,856	574,491	616,347	1,681	23,491	25,172	1.089	17,586	18,675	40	41	41	26	31	30
22	Shahpur ...	45,388	323,408	368,796	2,266	12,250	14,516	1,670	9,775	11,445	50	38	39	37	30	31
23	Mooltan ...	69,335	390,430	459,765	3,340	12,005	15,345	2,287	9,405	11,692	48	31	33	33	24	25
24	Jhang ...	38,850	309,177	348,027	1,477	9,518	10,995	882	5,624	6,506	38	31	31	23	18	19
25	Montgomery ...	21,055	338.382	359,437	761	10,944	11,705	539	6,701	7,240	36	32	32	25	20	20
26	Muzaffargarh ...	19,586	275,961	295,547	586	9,900	10,486	483	8,032	8,515	30	36	35	25	29	29
27	Dera Ismail Khan ...	41,064	353,800	394,864	1,163	8,203	9,366	1,331	9,067	10,398	28	23	24	32	26	26
28	Dera Ghází Khan ...	35,253	274,725	309,978	1,293	6,677	7,970	1,006	4,616	5,622	37	24	26	28	17	18
29	Bannu ...	20,925	266,622	287,547	665	5,600	6,265	998	6,861	7,859	31	21	22	48	26	27
30	Pesháwar ...	59,447	440,996	500,443	1,675	2,703	4,378	2,697	6,555	9,252	28	6	9	45	15	18
31	Hazára ...	13,610	353,608	367,218	296	5,104	5,400	448	5,582	6,030	22	14	15	33	16	16
32	Kohát ...	11,043	134,376	145,419	236	1,571	1,807	450	2,147	2,597	21	12	12	41	16	18
	Total ...	2,038,037	15,449,088	17,487,125	68,014	476,645	544,659	63,325	409,406	472,731	33	31	31	31	26	27

Some very interesting facts are evidenced from the figures given in the above table.

(1). It will be seen that taking the Province as a whole, the births exceed the deaths by 71,928 or 4 per mille per annum, thus shewing that for every 100 deaths there are 115 births, or 15 per cent. per annum in excess of the deaths on the total population. Calculated at this rate of increase the estimated population of the Punjab, which was 17,487,125 in 1868, will have amounted at the end of 1880 (12 years) to 18,350,261 or an increase of 863,136. I refrain, however, from making any further observations on this subject as the recent census of 1881 will shortly reveal to us whether the results arrived at, from a study of the Vital Statistical figures, are accurate or not.

(2). That both the town birth and death rates of the Province taken as a whole are in excess of those of rural circles, a circumstance which I think is chiefly due to more efficient registration in the former than in the latter.

(3). The fecundity of the urban and rural population in each district of the Province. This, it will be seen, is most conspicuous in the districts of Ludhiána, Amritsar, Siálkot, Lahore, Gujrat, Shahpur and Mooltan, and some others.

In order to shew the births and deaths registered in the Province in each quarter of the year 1880, I reproduce here extracts paras. 2, 3 and 4 from my letter No. 378, dated 21st January 1881, forwarding for publication in the Local Government Gazette, the comparative statement of births and deaths registered in the urban and rural population of the Punjab Province during the last quarter of the year ending 31st December 1880.

Para 2. “ The return shews a still further improvement in the registration of births during the period under review. In the first quarter of the year the number of births registered was 114,729, in the second 96,871, in the third 144,340, and in the last or fourth quarter 188,719, giving, respectively, a ratio of 26, 22, 33 and 43. By sexes they were as detailed in the margin. Of the total births registered during the quarter under report, 102,054 were male and 86,665 female, or at the rate of 118 male to every 100 female births. This excess of male over female births which has also been observed in the three previous quarters is enormously high, compared with that of different countries in Europe, and is a circumstance which shews very clearly that registration of female births is neglected.

Year 1880.	Males.	Females.	Total.
1st Quarter ...	64.508	50,221	114,729
2nd Do. ...	52,834	44,037	96,871
3rd Do. ...	78,833	65,507	144,340
4th Do. ...	102,054	86,665	188,719
Total ...	298,229	246,430	544,659
Annual rate per 1,000 of the estimated population ...	17	14	31

Para. 3. “ I append a statement shewing by quarterly periods the proportion of male to every 100 female births amongst the different classes of population—

Year 1880.	*Proportion of male to every* 100 *female births.*		
	Hindús.	Muhammadans.	Others.
1st Quarter	128	129	123
2nd Do.	119	120	123
3rd Do.	119	121	121
4th Do.	118	118	115
Total ...	121	122	120

Para. 4. “ The annual rates represented by the births and deaths registered in the urban and rural population of the Punjab Province during 1880 are 31 and 27. By the quarterly periods they are as below—

	1st Quarter.		2nd Quarter.		3rd Quarter.		4th Quarter.		Total.	
	Birth-rate.	Death-rate.	Birth-rate.	Death-rate.	Birth-rate.	Death-rate.	Birth-rate.	Death-rate.	Birth-rate.	Death-rate.
Urban	31	29	22	27	35	30	46	37	33	31
Rural	26	26	22	23	33	25	43	32	31	26
Total for the Province ...	26	27	22	23	33	26	43	33	31	27

Thus it will be observed that in both the two first quarters of the year, the total provincial birth and death rates were almost on a par with one another, whereas in the two last quarters the birth-rate was in excess of the death-rate by 7 and 10 per mille, respectively. Calculated on these figures there are 115 births annually to every 100 deaths."

The births and deaths registered in the principal towns.

13. The following statement shews the number of births and deaths registered in the 52 principal towns of the Province.

Comparative Statement of Births and Deaths registered in the 52 large Municipal towns in the Punjab and their birth and death rates during the year 1880.

Number.	Districts.	Towns.	Population.	Births.			Deaths.			Birth-Rates.			Death-Rates.		
				Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.
1	Delhi ...	Delhi ...	115,992	2358	2,048	4,406	2,450	2,321	4,771	20	18	38	39	43	41
2		Do. Suburbs ...	44,561	865	818	1,683	632	525	1,157	19	18	38	26	26	26
3		Sonepat ...	13,637	181	190	371	169	133	302	13	14	27	24	20	22
4	Gurgaon ...	Farukhnagar ...	10,594	112	120	232	204	167	371	10	11	22	38	31	35
5		Réwári ...	25,190	436	365	801	371	301	672	17	14	32	29	24	27
6		Firozpur ...	10,530	116	128	244	181	141	322	11	12	23	33	28	30
7		Palwal ...	13,553	230	222	452	227	193	420	17	16	33	33	29	31
8	Karnál ...	Karnál ...	24,015	312	242	554	608	475	1,083	13	10	23	48	42	45
9		Kaithal ...	15,799	130	119	249	182	165	347	8	7	16	23	21	22
10		Pánipat ...	24,500	411	421	832	403	345	748	17	17	34	32	29	30
11	Hissar ...	Hissar ...	14,162	176	134	310	218	144	362	12	9	22	29	22	25
12		Hánsi ...	12,210	193	176	369	160	141	301	16	14	30	25	24	25
13		Bhiwáni ...	33,220	661	636	1,297	380	373	753	20	19	39	22	24	23
14	Rohtak	Rohtak ...	14,994	184	166	350	160	144	304	12	11	23	21	20	20
15		Jhajjar ...	12,456	190	155	345	144	107	251	15	12	28	23	17	20
16	Sirsa ...	Sirsa ...	12,807	168	155	323	127	86	213	13	12	25	18	15	17
17	Umballa ...	Umballa ...	26,258	528	455	983	496	370	866	20	17	37	34	31	33
18		Jagádhri ...	12,522	209	134	343	196	150	346	17	11	27	29	36	28
19		Shahabad ...	11,660	164	131	295	148	130	278	14	11	25	23	24	24
20		Sádhaura ...	11,167	152	120	272	121	129	250	14	11	24	21	24	22
21		Rúpar ...	10,261	129	123	252	153	119	272	12	12	24	26	27	26
22	Ludhiána ...	Ludhiána ...	40,385	897	832	1,729	748	707	1,455	22	21	43	33	39	36
23		Jagraon ...	16,321	422	405	827	284	259	543	26	25	51	33	33	33
24	Jullundur ...	Jullundur ...	35,222	618	638	1,256	544	431	975	17	18	36	28	27	28
25		Do. Suburbs ...	15,702	236	220	456	183	166	349	15	14	29	22	22	22
26		Kartárpur ...	11,053	141	111	252	138	96	234	13	10	23	23	18	21
27		Ráhon ...	12,914	189	174	363	247	251	498	15	13	28	36	41	38
28	Hoshiárpur...	Hoshiárpur ...	13,138	257	252	509	217	208	425	19	19	39	31	34	32
29		Tánda and Urmar ...	13,971	196	152	348	224	200	424	14	11	25	30	31	30
30	Amritsar ...	Amritsar ...	136,166	3,004	2,884	5,888	2,774	2,486	5,260	22	21	43	35	43	39
31	Gurdáspur ...	Batála ...	26,929	414	381	795	192	164	356	15	14	29	14	13	13
32	Siálkot ...	Siálkot ...	32,989	556	454	1,010	451	351	802	17	14	31	25	23	24
33	Lahore ...	Lahore ...	92,035	1,679	1,434	3,113	1,425	1,299	2,724	18	16	34	28	32	29
34		Do. Suburbs ...	36,406	351	264	615	894	324	1,218	10	7	17	38	25	33
35		Kasur ...	16,793	348	260	608	219	187	406	21	15	36	25	23	24
36	Gujránwála...	Gujránwála ...	20,362	456	401	857	336	314	650	22	20	42	30	34	32
37		Wazirabad ...	15,346	234	208	442	225	180	405	15	13	29	26	27	26
38	Ferozepore ...	Ferozepore ...	15,168	407	316	723	431	308	739	27	21	48	49	48	49
39	Rawalpindi ...	Rawalpindi ...	20,802	354	309	663	830	442	1,272	17	15	32	65	55	61
40	Jhelum ...	Jhelum ...	11,319	79	60	139	230	70	300	7	5	12	31	18	26
41		Pind Dádan Khan ...	15,397	289	260	549	240	206	446	19	17	36	29	29	29
42	Gujrat ...	Gujrat ...	17,401	425	378	803	192	159	351	24	22	46	21	19	20
43		Jalálpur ...	14,014	272	206	478	239	182	421	19	15	34	31	28	30
44	Shahpur ...	Bhera ...	14,710	399	374	773	247	272	519	27	25	52	32	38	35
45	Mooltan ...	Mooltan ...	29,448	808	717	1,525	516	477	993	27	24	52	33	35	34
46		Do. Suburbs ...	21,430	523	496	1,019	421	332	753	24	23	47	35	35	35
47	Jhang ...	Maghiána ...	13,618	279	238	517	129	152	281	20	17	38	17	26	21
48		Chiniot ...	11,999	190	217	407	142	157	299	16	18	34	23	27	25
49	Dera I. Khan...	Dera Ismail Khan ...	19,954	316	241	557	288	282	570	16	12	28	27	30	28
50	Dera G. Khan...	Dera Ghází Khan ...	19,133	384	298	682	294	242	536	20	15	36	27	29	28
51	Pesháwar ...	Pesháwar ...	58,430	879	752	1,631	1,467	1,157	2,624	15	13	28	45	45	45
52	Kohát ...	Kohát ...	11,043	131	105	236	248	120	368	12	9	21	41	24	33
		GRAND TOTAL ...	1,299,686	23,638	21,095	44,733	22,745	18,840	41,585	18	16	34	32	32	32

The births and deaths registered in the 48 villages on the Western Jumna Canal in the Districts of Delhi and Karnál.

14. On the next page is given the usual statement shewing the births and deaths registered in the 48 villages on the Western Jumna Canal, in the districts of Delhi and Karnál, in which special registration has been carried on from April 1878 for the purpose of ascertaining what effect Canal irrigation has upon the health of the people inhabiting the villages in close proximity to it.

Statement showing Births and Deaths registered in the villages situated on the

1	2	3	4			5			6			7		8					
			POPULATION ACCORDING TO CENSUS OF 1877.			TOTAL NO. OF BIRTHS REGISTERED.			TOTAL NO. OF DEATHS REGISTERED.					CAUSES OF DEATH.					
Number.	District.	NAME OF VILLAGES.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Birth-rate per mille of population per annum.	Death-rate per mille of population per annum.	Cholera.	Small-pox.	Fevers.	Bowel complaints.	Injuries.	All other causes.
1	DELHI	Tajpur (Tihari Khurd) ...	214	205	419	13	4	17	10	3	13	40	31	...	...	13	...	...	...
2		Bathgaon ...	2,396	2,046	4,442	69	72	141	145	110	255	32	57	...	1	178	29	...	47
3		Barawasni ...	988	907	1,895	38	35	73	55	48	103	38	54	...	...	82	4	1	16
4		Mahra ...	873	773	1,646	31	20	51	62	43	105	31	64	...	1	90	1	...	13
5		Dabarpur ...	253	203	456	4	13	17	11	13	24	37	53	...	...	20	...	...	4
6		Hulaheri ...	478	416	894	10	12	22	21	18	39	25	44	..	...	34	...	...	5
7		Garhi Brahmnán ...	277	268	545	7	3	10	17	12	29	18	53	...	...	27	...	1	1
8		Bádshahpur Májri ...	196	181	377	3	6	9	12	7	19	24	50	...	...	19	...	...	...
9		Jáji ...	296	285	581	8	4	12	19	10	29	21	50	...	...	25	...	...	4
10		Kakrohi ...	1,089	1,020	2,109	39	35	74	45	41	86	35	41	...	...	67	2	...	17
11		Juan ...	1,563	1,476	3,039	49	41	90	75	56	131	30	43	...	...	107	...	...	24
12		Sitauli ...	432	403	835	12	10	22	26	20	46	26	55	...	...	39	...	...	7
13		Chitánah ...	442	393	835	20	13	33	29	15	44	39	53	...	...	40	...	...	4
14		Kheri Darya ...	332	304	636	11	6	17	10	17	27	27	42	...	...	18	1	...	8
15		Jafarabád ...	249	227	476	10	9	19	10	4	14	40	29	...	...	13	1	...	...
16		Khizarpur Ját ...	218	191	409	6	5	11	11	11	22	.27	54	...	...	19	2	...	1
17		Máihlana ...	614	537	1,151	26	16	42	32	15	47	36	41	...	...	37	1	...	9
18		Kareori ...	403	353	756	6	9	15	20	20	40	20	53	...	...	36	...	...	4
19		Hassanyárpur (Tihari Kalan)	217	188	405	11	8	19	10	12	22	47	54	..	..	15	1	...	6
20		Bágru ...	381	322	703	13	10	23	8	9	17	33	24	...	...	12	1	1	3
21		Jharauti ...	261	253	514	10	4	14	7	7	14	27	27	...	...	7	1	...	6
22		Anandpur ...	151	136	287	2	1	3	8	4	12	10	42	...	...	8	...	...	4
23		Bhadhánah ...	648	585	1,233	18	26	44	27	24	51	36	41	...	...	31	6	...	14
24		Jharant ...	318	261	579	10	6	16	11	13	24	28	41	...	...	20	2	...	2
25		Rohát ...	1,468	1,293	2,761	46	39	85	68	42	110	31	40	...	2	79	9	1	19
		Total ...	14,757	13,226	27,983	472	407	879	749	574	1,323	31	47	...	4	1,036	61	4	218
1	KARNAL.	Kharkali ...	72	50	122	6	2	8	4	...	4	65	33	...	...	1	...	...	3
2		Jhiwarheri ...	187	160	347	6	9	15	10	11	21	43	60	...	...	15	...	...	6
3		Hassanpur ...	207	190	397	9	9	18	11	11	22	45	55	...	...	19	...	...	3
4		Rasin ...	222	199	421	7	7	14	8	12	20	33	47	...	...	18	...	...	2
5		Phorlak ...	684	700	1,384	23	21	44	36	31	67	32	48	...	...	59	...	1	7
6		Opli ...	36	44	80	1	1	2	...	...	...	25	...	...	...	...	...	...	...
7		Garaundah ...	2,061	1,568	3,629	74	68	142	68	63	131	39	36	...	3	70	6	...	52
8		Malakpur ...	89	63	152	4	1	5	2	2	4	33	26	...	...	2	...	...	2
9		Bádshahpur ...	31	20	51	1	1	2	1	1	2	39	39	...	...	2	...	...	...
10		Ghora Gharri ...	89	75	164	2	4	6	6	4	10	36	61	...	...	7	2	...	1
11		Sheikhpura ...	395	379	774	20	12	32	29	19	48	41	62	...	...	43	...	...	5
12		Godah ...	627	551	1,178	15	11	26	29	17	46	22	39	...	...	42	2	...	2
13		Kohand ...	651	501	1,152	20	15	35	20	21	41	30	35	...	...	33	...	...	8
14		Ganjar ...	311	249	560	5	6	11	6	11	17	20	30	...	...	11	...	...	6
15		Barauli ...	406	361	767	9	7	16	20	14	34	21	44	...	...	26	...	1	7
16		Babarpur ...	202	183	385	5	5	10	6	5	11	26	28	...	...	7	...	...	4
17		Begampur ...	127	122	249	2	8	10	7	11	18	40	72	...	2	11	...	...	5
18		Dolánah ...	494	438	932	17	13	30	28	33	61	32	65	...	...	52	1	1	7
19		Kotánah ...	40	27	67	...	...	...	2	...	2	..	30	...	...	1	...	...	1
20		Baholi ...	363	235	598	12	11	23	17	15	32	38	53	...	...	27	...	...	5
21		Razapur ...	88	35	123	3	4	7	1	1	2	57	16	...	...	1	...	...	1
22		Khacroli ...	532	458	990	20	17	37	23	20	43	37	43	...	...	36	...	...	7
23		Muhammadpur ...	340	291	631	9	10	19	22	16	38	30	60	...	...	28	...	...	10
		Total ...	8,254	6,899	15,153	270	242	512	356	318	674	34	44	...	5	511	11	3	144

Western Jamna Canal in the Delhi and Karnál Districts during the year 1880.

9																		10												11
AGES AT DEATHS.																		DEATHS BY MONTHS.												
Under 1 *year.*		1 *year and under* 6.		6 *and under* 12.		12 *and under* 20.		20 *and under* 30.		30 *and under* 40.		40 *and under* 50.		50 *and under* 60.		60 *and upwards.*														
Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	January.	February.	March.	April	May.	June.	July.	August.	September.	October.	November.	December.	Number.
...	...	1	1	...	...	...	...	...	...	3	1	3	...	1	1	2	...	2	3	3	...	2	1	...	...	...	1	1	...	1
27	26	13	16	4	2	8	4	19	8	21	8	19	19	13	8	21	19	34	19	13	16	14	11	10	12	33	26	38	29	2
6	12	3	6	1	3	2	2	12	5	4	4	10	7	4	2	13	7	12	11	6	10	5	4	3	2	11	8	15	16	3
11	10	7	5	...	...	3	...	7	2	7	9	8	9	13	3	6	5	13	6	6	5	7	9	10	5	9	9	9	17	4
2	2	...	3	...	1	...	...	3	1	...	...	3	4	3	2	...	...	4	2	1	...	1	1	1	1	...	7	2	4	5
4	4	1	1	1	...	1	...	4	3	2	2	3	4	3	2	2	2	6	1	2	4	4	2	...	4	2	6	4	4	6
5	...	1	3	1	...	...	...	1	2	2	1	1	3	2	3	4	...	3	5	4	2	2	...	2	1	4	3	...	3	7
...	...	3	...	...	1	...	1	5	..	1	1	1	2	...	1	2	1	4	3	1	...	...	1	1	1	4	...	2	2	8
4	1	...	1	...	...	2	1	...	3	6	...	3	2	1	1	3	1	3	4	2	1	2	1	...	1	2	1	4	8	9
5	9	3	2	2	4	2	1	8	6	5	3	7	6	5	2	8	8	4	8	9	7	2	5	4	10	5	4	20	8	10
13	11	11	7	1	3	4	1	9	4	10	9	16	9	6	8	5	4	14	7	5	7	5	17	4	4	12	19	18	19	11
4	2	4	1	1	...	3	2	5	5	2	1	3	5	1	1	3	3	2	5	2	1	2	7	1	...	3	13	6	4	12
6	4	4	1	1	2	1	...	2	2	4	1	6	1	2	1	3	3	5	1	1	...	1	1	1	5	3	7	12	7	13
4	4	2	1	...	...	...	...	1	2	...	1	1	5	1	1	1	3	1	3	1	3	1	...	2	5	3	5	1	2	14
2	...	2	1	1	1	...	...	...	...	2	2	...	..	...	...	3	...	1	...	1	...	...	..	...	1	3	3	1	4	15
1	3	...	1	1	...	2	...	1	...	3	1	1	3	2	2	...	1	...	3	2	1	...	...	2	6	3	4	1	...	16
9	1	1	3	1	...	1	...	7	4	2	1	2	4	4	...	5	2	8	4	3	3	4	4	4	3	2	1	5	6	17
2	4	1	2	...	2	...	1	5	2	2	2	2	4	2	1	6	2	3	6	4	1	2	2	3	3	3	6	3	4	18
6	2	...	2	...	2	...	1	...	1	...	1	1	2	...	...	3	1	3	2	...	...	2	...	...	1	3	1	4	6	19
1	1	1	2	...	...	1	..	1	1	1	1	...	...	1	2	2	2	3	2	...	3	1	...	1	1	...	3	1	2	20
2	...	1	2	...	...	...	..	...	...	1	1	...	2	1	1	2	1	3	1	1	1	...	1	2	1	1	1	...	2	21
2	1	...	...	...	...	...	1	...	1	...	...	2	...	2	1	2	...	1	1	3	1	...	2	...	1	1	...	2	...	22
3	6	1	...	...	...	...	1	6	1	6	2	3	5	3	6	5	3	4	2	3	4	6	2	2	3	4	10	5	6	23
...	1	2	5	1	...	...	...	1	1	4	1	...	...	1	3	2	2	5	3	2	1	2	3	...	1	3	2	1	1	24
15	8	11	9	2	1	6	2	8	11	5	1	6	3	8	1	7	6	6	5	9	6	11	6	8	14	5	12	20	8	25
134	112	73	75	18	22	36	18	105	65	93	54	101	99	79	53	110	76	144	107	84	77	76	80	61	86	119	152	175	162	
2	...	...	...	..	...	...	...	1	...	1	...	...	...	...	...	...	...	1	...	...	...	...	...	1	...	1	...	1	...	1
2	3	...	1	...	1	1	...	1	...	1	...	3	3	...	1	2	2	7	...	2	...	3	1	1	1	2	2	2	...	2
1	4	3	2	...	...	...	...	3	1	...	1	1	...	2	3	1	...	5	2	2	...	...	...	1	2	3	2	4	1	3
...	2	1	1	...	...	1	1	1	1	...	1	2	4	2	...	1	2	1	4	2	4	...	...	2	1	2	2	2	...	4
9	5	7	3	2	1	3	1	2	3	4	2	3	6	5	5	1	5	2	2	10	4	3	3	5	5	9	6	7	11	5
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	6
23	23	13	9	2	4	4	1	1	5	4	5	3	6	9	2	9	8	16	9	11	8	13	15	11	16	13	6	3	10	7
...	...	2	1	...	...	...	...	...	...	...	..	...	1	...	...	...	...	...	...	...	..	...	...	.2	2	...	...	...	...	8
...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	...	...	...	...	...	1	...	1	...	...	...	..	...	...	...	9
...	...	...	2	1	...	...	...	...	...	...	...	2	1	2	...	1	1	2	3	...	...	...	1	1	...	...	2	1	...	10
7	5	3	3	3	1	...	..	6	3	1	1	3	2	3	2	3	2	6	3	2	4	1	4	3	6	10	2	3	4	11
1	1	2	3	2	1	2	...	...	2	4	3	6	2	1	1	11	4	6	3	4	7	2	4	5	4	3	2	2	4	12
4	6	1	1	...	1	1	...	1	3	2	1	1	3	5	3	5	3	7	5	1	2	3	3	3	1	6	4	4	2	13
1	4	1	2	...	...	...	...	...	...	1	1	1	2	2	...	...	2	1	2	...	1	2	3	.	...	1	4	3	...	14
1	...	4	1	...	...	...	...	1	3	2	5	1	1	8	1	3	3	3	2	4	4	2	5	2	1	...	4	4	3	15
2	...	...	2	...	1	...	...	...	...	...	1	2	1	1	...	1	...	1	1	1	...	2	...	1	2	1	1	1	...	16
2	3	1	...	1	...	...	...	1	1	...	2	2	2	...	1	...	2	5	2	1	1	1	1	1	...	2	1	2	1	17
1	2	1	3	...	1	8	1	2	6	5	6	...	10	8	2	3	2	23	5	2	1	1	...	2	6	3	8	8	2	18
...	...	...	...	..	...	1	...	1	...	...	...	...	...	...	...	...	...	1	...	1	...	...	...	..	...	...	...	...	...	19
3	2	1	...	...	...	...	...	2	3	4	4	3	2	2	3	2	1	6	4	2	...	2	1	3	5	1	5	3	...	20
...	1	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	..	...	...	...	2	...	...	...	...	21
5	4	...	1	...	...	2	1	2	1	4	3	3	1	1	5	6	4	7	8	3	5	...	3	...	1	5	4	2	5	22
3	3	2	2	1	1	1	1	2	1	6	2	1	2	3	2	3	2	5	1	4	2	1	1	2	2	5	7	6	2	23
67	68	42	37	12	12	24	6	27	33	39	38	37	50	56	31	52	43	105	56	53	43	37	45	46	57	67	62	58	45	

Diseases.

Villages.	Cholera.	Small-pox.	Fevers.	Bowel complaints.	All other causes.
25 villages in the Delhi District	...	4	1,036	61	222
23 villages in the Karnál District	...	5	511	11	147

Ages.

Villages.	Ages at death.									Deaths at all ages.
	Under 1 year.	1-6.	6-12.	12-20.	20-30.	30-40.	40-50.	50-60.	60 and upwards.	
25 villages in Delhi District	246	148	40	54	170	147	200	132	186	1,323
23 villages in Karnál District	135	79	24	30	60	77	87	87	95	674

With few exceptions the mortality in all the villages exceedingly high.

Villages.	1879.		1880.	
	Birth-rate.	Death-rate	Birth-rate	Death-rate
25 villages in the Delhi District...	24	65	31	47
23 villages in the Karnál District	27	76	34	44

15. In the margin is given a table comparing the birth and death rates of the villages in the Delhi and Karnál districts for the year under review and the year preceding it. With few exceptions the mortality in all the villages was exceedingly high, in some places being 60, 61, 62 and even so far as 72.

In the villages in the Delhi district, the total mortality rose from 86 in August to 119 in September, 152 in October, and reached its maximum of 175 in November. In the Karnál villages the most sickly months were January, September and October.

More than two-thirds of the mortality in the selected areas due to fever.

16. More than two-thirds of the total mortality in the selected areas was due to fever, as will be seen from the above statement shewing the deaths from different diseases.

From this year's experience, a year which was healthy throughout the Province, it is clear that the health of the population of these villages has suffered in greater proportion to that of any other locality in the Province. This may be due to canal irrigation, but it would be premature of me to ascribe it exclusively to this cause just now, for, as I stated in para. 17 of my Sanitary Report for 1878, " the special registration will have to be continued for some years before any definite opinion can be formed on the subject."

Mortality amongst the European and Eurasian population.

17. The usual statements shewing the total number of births and deaths registered in each district of the Province, and the mortality from different diseases amongst the European and Eurasian population under registration, are herewith appended.

Statement showing the number of births registered in the under-mentioned districts of the Punjab amongst the European and Eurasian population during 1880.

Number.	District.	Population.	Births.			Remarks.
			Male.	Female.	Total.	
1	Delhi	504	3	5	8	
2	Lahore	1,728	7	5	12	
3	Gurdáspur (Dalhousie) ...	344	7	5	12	
4	Rawalpindi (Murree)... ...	1,526	5	12	17	
5	Simla	2,203	38	27	65	
6	Sirsa	23	1	...	1	
7	Jullundur	55	2	...	2	
	Total ...	6,383	63	54	117	Birth rate 18

RETURN A.

Deaths registered according to classes and from different causes among the European and Eurasian Population in the undermentioned Districts during the year 1880.

1	2	3	4			5							6			7		
Districts.	Classes.		Causes of Death.															
	European and Eurasian.	Population.	*Cholera.*			Small-pox.							*Fevers.*			*Bowel complaints.*		
						Under one year.		1—12.		*12 and over 12.*								
			Males.	Females.	Total.	Males.	Females.	Males.	Females.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.
Delhi	25	504	...	...	...	...	...	...	...	...	...	...	4	1	5	1	...	1
Hissar	1	63	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Umballa	1	58	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1
Simla	29	2,203	...	...	...	...	...	...	...	...	...	...	3	...	3	1	...	1
Jullundur... ...	2	55	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Kángra	3	63	...	...	...	...	...	...	...	...	...	...	3	...	3	...	...	...
Amritsar	1	196	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Gurdáspur (Dalhousie)	3	344	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Lahore	58	1,728	2	...	2	...	...	...	...	...	...	...	5	...	5	4	2	6
Ferozepore ...	1	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	...
Rawalpindi (Murree)	6	1,526	...	...	...	...	...	...	...	...	...	...	1	4	5	...	...	...
Jhelum	2	58	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1
D. I. Khan ...	3	11	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1
Bannu	1	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	...
Pesháwar	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Hazára	1	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Kohát	5	...	...	...	...	...	...	...	...	...	...	...	3	...	3	...	1	1
Total ...	144	6,811	2	...	2	...	...	...	...	...	...	...	21	5	26	8	4	12
Ratio of deaths per 1,000 of population ...			...	...	0·20	...	...	...	...	...	...	...	...	...	4	...	...	2

1	8			9			10			11			12			13			14
Districts.	Causes of Death.																		
	Injuries.												*All other causes.*			*Total deaths from all causes.*			Ratio of total deaths per 1,000 of population per annum.
	Suicide.			*Wounding.*			*Accident.*			*Snake-bite or killed by wild beasts.*									
	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	
Delhi	...	...	...	...	...	...	1	...	1	...	...	...	16	2	18	22	3	25	
Hissar	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	1	...	1	
Umballa	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	
Simla	...	...	...	...	...	...	...	...	...	...	...	...	10	15	25	14	15	29	
Jullundur... ...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	2	2	...	2	
Kángra	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	...	3	
Amritsar	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	1	...	1	
Gurdáspur (Dalhousie)	...	...	...	...	...	...	...	...	...	...	...	...	1	2	3	1	2	3	
Lahore	...	...	...	...	...	...	...	...	...	.	...	...	30	15	45	41	17	58	
Ferozepore ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	
Rawalpindi (Murree)	...	...	...	...	...	...	...	1	1	...	...	...	...	...	...	1	5	6	
Jhelum	...	...	...	...	...	...	1	...	1	...	...	...	...	...	...	2	...	2	
D. I. Khan ...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	2	3	...	3	
Bannu	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	
Pesháwar	...	...	...	...	...	...	...	...	...	...	...	...	2	...	2	2	...	2	
Hazára	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	1	...	1	
Kohát	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	4	1	5	
Total ...	1	...	1	...	...	...	2	1	3	...	...	...	66	34	100	100	44	144	
Ratio of deaths per 1,000 of population ...	4 0·59												...	...	15	...	...	21	

RETURN B.

Deaths registered according to age during the year 1880.

1	2		3				4		5		6		7		8		9		10		11		12		13	
Districts.	Born dead.		Classes of Born dead.				Ages at death.																		Total.	
							Under one year.		1—6.		6—12.		12—20.		20—30.		30—40.		40—50.		50—60.		*60 and upwards.*			
	Males.	Females.	Christians.	Muhammadans.	Hindús.	Other classes.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.
Delhi ...	...	...	...	...	...	...	3	...	2	1	1	...	...	...	8	...	4	1	2	1	...	...	2	...	22	3
Hissar ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	1	...
Umballa ...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	1
Simla ...	2	...	2	...	...	...	2	4	2	1	...	1	1	1	2	1	1	3	2	2	1	1	3	1	14	15
Jullundur ...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	2	...
Kángra ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	...	1	...	3	...
Amritsar ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	1	...
Gurdáspur ...	1	...	1	...	...	...	1	...	...	...	...	...	...	...	...	1	...	...	...	...	...	1	...	...	1	2
Lahore ...	...	...	...	...	...	...	8	2	4	1	...	...	1	2	7	5	9	2	8	...	3	4	1	1	41	17
Ferozepore ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	1	...
Rawalpindi ...	1	...	1	...	...	...	...	1	...	...	...	...	...	...	1	1	...	1	...	...	...	...	...	2	1	5
Jhelum ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	...	...	...	...	...	...	2	...
D. I. Khan ..	...	...	...	...	...	...	...	...	...	...	...	...	...	..	1	...	2	...	...	...	...	...	...	...	3	...
Bannu ...	..	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	1	...
Pesháwar ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	1	...	2	...
Hazára ...	...	...	...	...	...	..	1	...	...	...	...	...	...	...	..	...	...	...	...	...	...	...	...	...	1	...
Kohát ...	...	...	...	...	...	...	...	...	...	1	..	...	...	...	3	...	1	...	...	...	...	...	...	...	4	1
Total ...	4	...	4	...	...	...	16	7	8	4	1	1	2	4	26	8	21	7	14	3	4	6	8	4	100	44

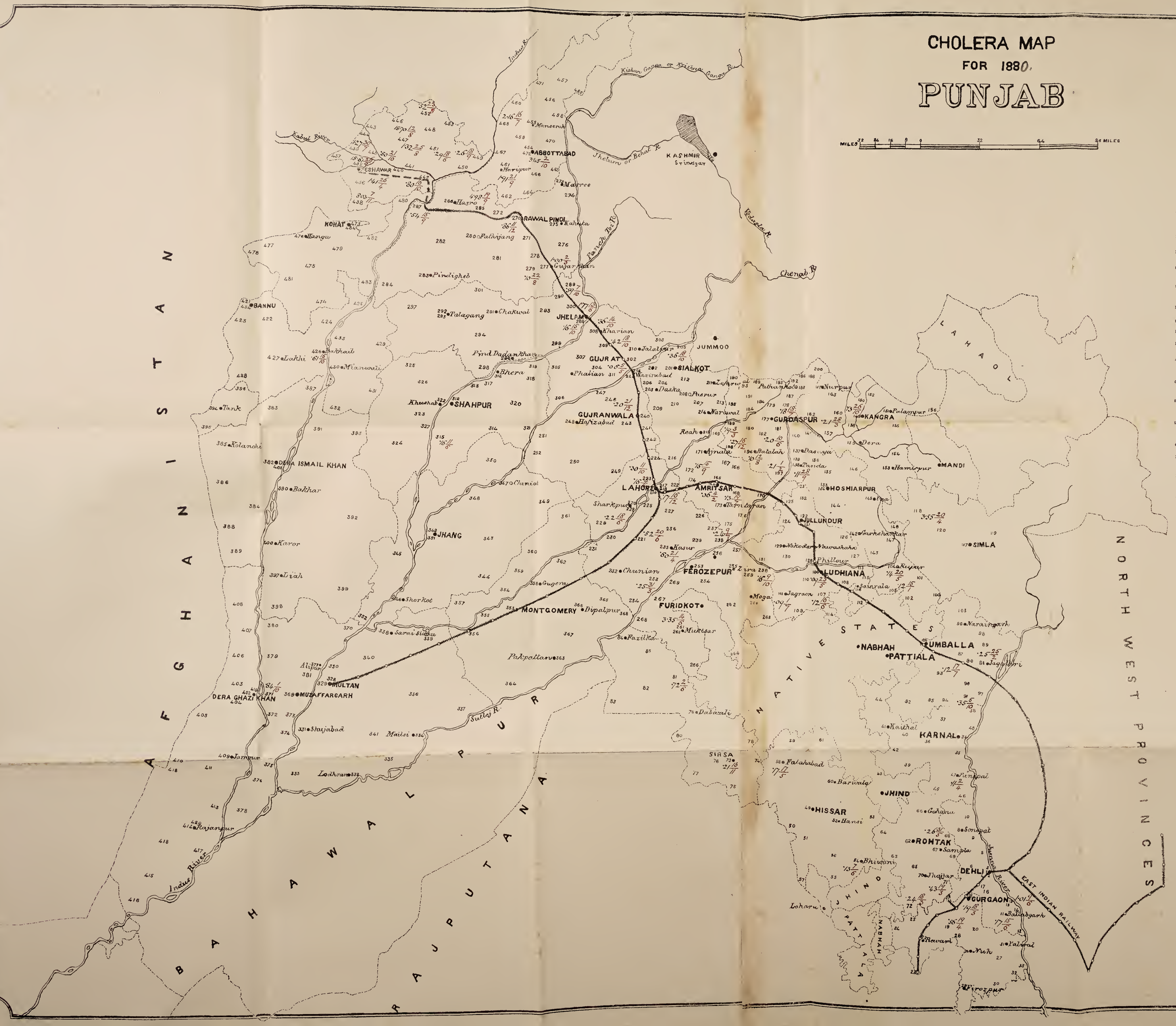
The number of municipal towns in the Punjab at the end of the year 1880.

18. During the year under review the municipal towns of Fatehgarh and Kot Isa Khan in the Ferozepore district were abolished, while Sohna, Nuh and Hodal in the Gurgaon district were constituted municipalities under the provision of Act IV of 1871. The number of municipal towns at the close of the year, including the four Hill Sanitaria and the 7 frontier Military cantonments, was 208.

The amount realized by fines imposed on persons for neglect to register births and deaths.

19. Rs. 280 were realized by fines imposed upon the people for neglect to register births and deaths. The amount realized on this account in the two preceding years was Rs. 205 and Rs. 214, respectively.

CHOLERA MAP
FOR 1880.
PUNJAB



Statement appended to map illustrating the distribution, &c., of Cholera in the Punjab during the year 1880.

District.	Number of circles of mortuary registration as shewn in the map.	Names of Rural Circles.	Population.	Date of first case of Cholera in the Circle during the year.	Date of last case of Cholera in the Circle during the year.	Total deaths from Cholera in the Circle during the year.	Period of maximum intensity of the disease. From	Period of maximum intensity of the disease. To	Number of villages in each of the rural circles.	Number of those Affected by Cholera.	Number of those Not affected by Cholera.
Delhi	11	Ballabgarh .. T.	50,142	15th June ..	15th June ..	1	9th June ..	15th Ju e ..	67	1	66
	15	Badarpur .. R. C.	9,868	9th „ ..	9th „ ..	1	„ ..	„ ..	82	1	81
Gargaon	18	Gargaon .. R. C.	52,298	18th March ..	18th March ..	1	18th March ..	10th April ..	91	1	90
	19	Pahorah .. R. C.	17,826	19th April ..	19th April ..	1	„ ..	„ ..	30	1	29
Karnal	47	Panipat .. T.	90,930	2nd April ..	2nd April ..	1	..	..	70	1	69
Hissar	54	Bhiwani .. T.	78,631	7th June ..	7th June ..	1	17th May ..	7th June ..	17	1	16
	58	Fatahabad .. T.	57,514	17th May ..	17th May ..	1	„ ..	„ ..	95	1	94
Rohtak	68	Kharkhauda ... T.	88,481	31st May ..	31st May ..	1	18th March ..	31st May ..	33	1	32
	71	Baoli .. R. C.	22,962	19th March ..	19th March ..	1	„ ..	„ ..	25	1	24
	72	Salhawas .. R. C.	40,059	18th „ ..	18th „ ..	1	„ ..	„ ..	71	1	70
Sirsa	73	Sirsa .. T.	47,215	13th November	13th November	1	2nd June ..	13th November	65	1	64
	81	Malot .. R. C.	13,928	2nd June ..	2nd June ..	1	„ ..	„ ..	63	1	62
Umballa	88	Jagadhri .. T.	80,216	25th February	9th March ..	2	15th January	5th October ..	141	2	139
	91	Ladwa .. T.	28,534	5th October ..	5th October ..	1	„ ..	„ ..	76	1	75
	93	Sahabad .. T.	82,279	17th July ..	17th July ..	1	„ ..	„ ..	130	1	129
	104	Rapar .. T.	70,067	20th May ..	20th May ..	1	„ ..	„ ..	171	1	170
	105	Marindah .. R. C.	79,843	15th January	15th January	1	„ ..	„ ..	177	1	176
Ludhiana	106	Ludhiána .. T.	110,473	23rd May ..	23rd May ..	1	23rd May ..	1st July ..	143	1	142
	107	Dehlon .. R. C.	19,075	16th June ..	16th June ..	1	„ ..	„ ..	103	1	102
	111	Jagraon .. T.	107,034	1st July ..	1st July ..	1	„ ..	„ ..	112	1	111
Simla	118	Kalka .. R. C.	2,816	20th April ..	20th April ..	1	..	..	1	1	..
Hoshiarpur ..	133	Urmar Tanda .. R. C.	91,224	28th September	28th September	1	..	..	121	1	120
Kangra	140	Kangra .. T.	78,817	26th October ..	26th October ..	1	28th March ..	26th October ..	78	1	77
	160	Jawala Mukhi .. T.	47,264	28th March ..	28th March ..	1	„ ..	„ ..	32	1	31
Amritsar	164	Amritsar .. T.	177,986	4th February	4th February	1	4th February	15th September	60	1	59
	168	Jandiala .. T.	76,287	19th July ..	19th July ..	1	„ ..	„ ..	101	1	100
	172	Lopoki .. R. C.	67,101	15th September	15th September	1	„ ..	„ ..	120	1	119
Gurdaspur ..	178	Dinanagar .. T.	54,229	18th July ..	18th July ..	1	1st February ..	16th December	155	1	154
	182	Rani .. R. C.	49,383	10th June ..	10th June ..	1	„ ..	„ ..	91	1	90
	196	Batala .. T.	102,401	12th August ..	12th August ..	1	„ ..	„ ..	181	1	180
	197	Srigovindpur .. T.	47,972	1st February ..	1st February ..	1	„ ..	„ ..	121	1	120
	198	Fathagarh .. T.	37,480	16th December	16th December	1	„ ..	„ ..	73	1	72
	199	Dera Nanak .. T.	52,232	3rd March ..	3rd March ..	1	„ ..	„ ..	107	1	106
Sialkot	205	Phukalian .. R. C.	27,796	18th October ..	18th October ..	1	..	..	75	1	74
Lahore	217	Lahore .. T.	181,450	4th April ..	25th May ..	3	31st March ..	16th December	13	1	12
	219	Anarkalli .. R. C.	59,221	16th December	16th December	1	„ ..	„ ..	68	1	67
	221	Rawind .. R. C.	19,264	20th June ..	20th June ..	1	„ ..	„ ..	47	1	46
	223	Shahdara .. R. C.	38,061	11th October ..	11th October ..	1	„ ..	„ ..	87	1	86
	229	Mongtanwala .. R. C.	44,327	18th June ..	18th June ..	1	„ ..	„ ..	195	1	194
	233	Khudian .. T.	40,104	31st March ..	31st March ..	1	„ ..	„ ..	108	1	107
	235	Kasur .. T.	82,860	21st April ...	20th October ..	5	„ ..	„ ..	127	3	124
	238	Khalara .. R. C.	40,892	9th July ..	9th July ..	1	„ ..	„ ..	52	1	51
Gujranwala ..	240	Akalgarh .. T.	50,078	21st December	21st December	1	..	..	98	1	97
Ferozepore ..	258	Dharmkot .. T.	61,316	9th October ..	9th October ..	1	14th June ..	9th October ..	121	1	120
	261	Muktsar .. T.	2,983	14th June ..	14th June ..	1	„ ..	„ ..	180	1	179
Rawalpindi ..	270	Rawalpindi .. T.	93,147	11th October ..	13th October ..	8	2nd March ..	13th October ..	224	1	223
	277	Gujar Khan .. R. C.	50,068	2nd March ..	14th June ..	5	„ ..	„ ..	145	3	142
	279	Jatli .. R. C.	95,456	22nd August ..	22nd August ..	1	„ ..	„ ..	155	1	154
	285	Hasan Abdal .. R. C.	32,149	19th September	12th October ..	16	„ ..	„ ..	77	2	75
	287	Attock .. T.	18,412	15th „	15th September	1	„ ..	„ ..	37	1	36
Jhelum	288	Jhelum .. T.	60,540	15th October ..	15th October ..	1	13th June ..	15th October ..	170	1	169
	289	Sohawa .. R. C.	16,805	7th „ ..	7th „ ..	1	„ ..	„ ..	72	1	71
	300	Dina .. R. C.	28,177	13th June ..	28th August ..	5	„ ..	„ ..	112	5	107
Gujrat	302	Gujrat .. T.	154,896	5th May ..	5th May ..	1	5th May ..	24th October ..	265	1	264
	303	Kharian .. R. C.	83,205	14th October ..	20th October ..	3	„ ..	„ ..	230	1	229
	309	Lala Musa .. R. C.	71,130	18th „ ..	24th „ ..	3	„ ..	„ ..	206	2	204
Shahpur	315	Sahiwal .. T.	62,667	11th June ..	11th June ..	1	..	..	171	1	170
Muzaffargarh ..	371	Kurashi .. R. C.	11,876	1st October ..	1st October ..	1	..	..	51	1	50
Bannu	426	Isa Khel .. T.	40,242	15th „ ..	20th October ..	3	15th October ..	20th October ..	43	1	42
Peshawar	435	Peshâwar .. T.	75,572	26th September	17th November	118	26th April ..	17th November	53	1	52
	436	Badhber .. R. C.	21,253	26th April ..	19th October ..	3	„ ..	„ ..	24	3	21
	438	Matanni .. R. C.	7,473	7th November	11th November	6	„ ..	„ ..	14	2	12
	439	Mutra .. R. C.	7,878	30th July ..	30th July ..	1	„ ..	„ ..	40	1	39
	442	Akora .. R. C.	12,448	16th October ..	16th October ..	1	„ ..	„ ..	33	1	32
	445	Khazana .. R. C.	20,055	21st „ ..	21st October ..	1	„ ..	„ ..	72	1	71
	446	Tangi .. R. C.	19,106	12th August ..	4th September	30	„ ..	„ ..	28	3	25
	447	Charsadda .. R. C.	30,268	25th „ ..	27th August ..	4	„ ..	„ ..	30	4	26
	449	Sowabi .. R. C.	39,016	18th September	18th September	1	„ ..	„ ..	40	1	39
	451	Rajar .. R. C.	34,189	18th June ..	18th June ..	1	„ ..	„ ..	49	1	48
	452	Katling .. R. C.	19,218	23rd August ..	23rd August ..	1	„ ..	„ ..	44	1	43
Hazara	461	Haripur .. T.	15,715	21st September	27th September	3	16th July ..	2nd October ..	144	3	141
	468	Karballian .. R. C.	4,625	16th July ..	16th July ..	1	„	„ ..	40	1	39
	472	Abbott-abad .. C.	2,894	2nd October ..	2nd October ..	1	„ ..	„ ..	1	1	..
			3,829,585	..	..	274	..	..	6,694	94	6,600

NOTE.—I.—The geographical position of the several Rural Circles is shown by numbers, from 1 to 484.

II.—The decimal figures show the mortality from cholera per 10,000 of population.

III.—The fractional figures in red ink indicate the dates of the first cases in each Circle.

SECTION VI.—CHIEF DISEASES OF THE YEAR.

A. CHOLERA.

The total deaths registered from cholera during the year.

20. The great epidemic of last year declined in September, and completely subsided in the following month. In November only 7 and in December 20 deaths from this disease were registered in the whole Province. Of the first set, 3 occurred in the Peshâwar District, 1 Siálkot, 2 Kángra, and 1 Jullundur. Of the second set, 16 occurred in the Dera Ismail Khan District, 1 Lahore, 2 Amritsar, and 1 Jullundur. Cholera during the year 1880 began with a single death reported in the Umballa District in January, and made very gradual progress month by month till it culminated in some local outbreaks in the North-western districts. But over the Province as a whole the disease remained inactive, or only shewed itself in a few sporadic cases in very widely separated localities; the season was decidedly non-epidemic, and only 274 deaths were reported from cholera for the whole Province during the year.

Statement shewing deaths from cholera by months and record of principal atmospheric changes for the Province.

22. From the subjoined statement shewing the cholera deaths by months, it will be seen that though the disease was present throughout the year, it remained in an almost entirely quiescent state till July, after which it manifested some signs of activity. For convenience of reference the record of principal atmospheric changes for the Province during each month is also included in the statement. They represent the mean of the Meteorological observations taken in 11 districts, which from their geographical position give an approximately accurate record of the meteorology of the Province.

Months.	Cholera deaths.	Thermometer's highest maximum.	Thermometer's lowest minimum.	Relative humidity.	Rainfall.
January	1	75·1	33·3	49	0·42
February	3	76·0	32·7	50	1·52
March	6	98·8	43·7	35	0·1
April	9	104·9	57·6	30	0·12
May	7	108·2	64·3	32	1·37
June	15	113·4	69·4	40	3·44
July	8	100·98	66·2	63	10·11
August	33	101·1	69·4	56	3·38
September	14	99·7	61·7	52	3·05
October	120	95·3	52·2	36	0·02
November	55	86·3	37·4	45	0·05
December	3	74·3	35·9	55	0·88

The bulk of the mortality occurred in the North-western Districts.

23. In the early part of August cholera broke out in an epidemic form, though happily with less than its usual violence, in the Peshâwar District, and continued to prevail there till the 3rd week of November, causing a total of 164 deaths, or nearly two-thirds of the entire cholera mortality of the Province.

The district of Rawalpindi was also affected about the same time, the total reported deaths there numbering 28. Whilst in the Lahore District, where the activity of the disease first manifested itself as early as April, only 14 deaths were reported for the rest of the year.

It is thus shewn that the bulk of the cholera mortality of the year occurred in the North-western Districts of the Province. And it is interesting to observe how the disease has developed its activity in this direction from small beginnings, steadily and slowly advancing upwards from the South-eastern Districts in the track of its usual progress in this Province.

The cholera map and subjoined statement shews the gradual progress of the disease upwards through the Province.

24. This gradual progress of the disease upwards through the Province will be clearly seen by reference to the cholera map and subjoined statement which shews the number of deaths registered from cholera in the district of the Punjab during each month of the year 1880,

Deaths registered from Cholera in the districts of the Punjab during each month of the year 1880.

Number.	DISTRICTS.			Population census 1868.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total for the year.
1	Delhi	...	...	608,850	...	...	...	...	...	2	...	...	...	...	...	...	2
2	Gurgaon	...	...	696,646	...	...	1	1	...	...	...	...	...	...	...	...	2
3	Karnál	...	...	610,927	...	...	...	1	...	...	...	...	...	...	...	...	1
4	Hissar	...	...	484,681	...	...	...	...	1	1	...	...	...	...	...	...	2
5	Rohtak	...	...	536,959	...	...	2	...	1	...	...	...	...	...	...	...	3
6	Sirsa	...	...	210,795	...	...	...	...	...	1	...	...	...	...	1	...	2
7	Umballa	...	...	1,008,860	1	1	...	1	1	...	1	...	...	1	...	...	6
8	Ludhiána	...	...	583,245	...	...	...	...	1	1	1	...	...	...	...	...	3
9	Simla	...	...	33,594	...	...	...	1	...	...	...	...	...	...	...	...	1
10	Jullundur	...	...	783,020	...	...	...	...	...	...	...	...	...	...	...	...	...
11	Hoshiárpur	...	...	938,890	...	...	...	...	...	...	...	...	1	...	...	...	1
12	Kángra	...	...	743,758	...	...	1	...	...	...	...	...	...	1	..	...	2
13	Amritsar	...	...	832,750	...	1	...	...	...	...	1	...	1	...	...	...	3
14	Gurdáspur	...	...	906,126	...	1	1	...	...	1	1	1	...	...	...	1	6
15	Siálkot	...	...	994,458	...	...	...	...	...	...	...	...	...	1	...	...	1
16	Lahore	...	...	775,551	...	...	...	4	1	2	1	...	...	5	...	1	14
17	Gujránwála	...	...	550,576	...	...	...	...	...	...	...	...	...	...	...	1	1
18	Ferozepore	...	...	533,416	...	...	...	...	...	1	...	...	...	1	...	...	2
19	Rawalpindi	...	...	699,647	...	...	1	...	1	1	...	1	4	20	3	...	31
20	Jhelum	...	...	500,988	...	...	...	...	...	3	1	1	...	2	...	...	7
21	Gujrat	...	...	616,347	...	...	...	...	1	...	...	...	...	6	...	...	7
22	Shahpur	...	...	368,796	...	...	...	...	...	1	...	...	...	...	...	..	1
23	Mooltan	...	...	459,765	...	...	...	...	...	...	...	...	...	...	...	...	...
24	Jhang	...	...	348,027	...	...	...	...	...	...	...	...	...	...	...	...	...
25	Montgomery	...	...	359,437	...	...	...	...	...	...	...	...	...	...	...	...	...
26	Muzaffargarh	...	...	295,547	...	...	...	...	...	...	...	...	...	1	...	...	1
27	Dera Ismail Khan		...	394,864	...	...	...	...	...	...	...	...	...	...	...	...	...
28	Dera Gházi Khan		...	309,978	...	...	...	...	...	...	...	...	...	...	...	...	...
29	Bannu	...	...	287,547	...	...	...	...	...	...	...	...	...	3	...	...	3
30	Pesháwar	...	...	500,443	...	...	...	1	...	1	1	30	7	76	51	...	167
31	Hazára	...	...	367,218	...	...	...	...	...	...	1	...	1	3	...	...	5
32	Kohát	...	...	145,419	...	...	...	...	...	...	...	...	...	...	...	...	...
	TOTAL		...	17,487,125	1	3	6	9	7	15	8	33	14	120	55	3	274

Information of earliest cases in each District.

25. Up to the month of April the mortality, with a solitary exception,—an indisputably genuine case of cholera,—in the Rawalpindi District, was wholly confined to the districts eastwards of Lahore, and subsequently to that month it manifested no activity in those districts such as that experienced in the districts to the North-westward of that point.

Thus Delhi and the districts of that division shew altogether only 5 deaths, all between March and June. In like manner Hissar and its districts shew 6 deaths during the same period, and an isolated one besides in November. The districts of the Umballa Division to the North and West of the preceding shew the presence of the disease at a still earlier period, the total deaths reported being 10 between January and October; prior to the death in January no cholera had been reported in these districts since the preceding October. Onwards in the same direction, the next group of districts, in the Jullundur Division, shews a marked abeyance of the disease, only 3 deaths altogether being reported here; none at all in Jullundur, where the last reported deaths occurred in the preceding November and December one in each month; only 1 in Hoshiárpur, in September; and 2 in Kángra, viz., 1 in March and 1 in October: the last deaths reported here being 2 in the preceding December. In the districts of the adjoining Amritsar Division we find the disease present as early as February, and 10 deaths reported during the year; the last death reported here in the preceding year was an isolated one in Siálkot during November.

These Eastern districts it will thus be seen give a total of only 35 deaths, the earliest of which occurred in the Umballa District in January and February, and in the Amritsar District in February and March. In the following month, April, we find the first signs of the activity of the disease in the adjoining districts of the Lahore Division, 4 deaths here being reported in April, 1 in May, 2 in June, 1 in July, 5 in August, and 1 in December—14 deaths all in the Lahore District itself; 2 deaths were reported in Ferozepore District, 1 in June and 1 in October; and a single death in Gujránwála, in December; total deaths in this group of districts, 17.

Proceeding onwards to the districts of the Rawalpindi Division, we find a single death reported in the beginning of March in the Rawalpindi District, and another in May, and in the same month another in the Gujrat District. In June we have one death again in Rawalpindi, 3 in the adjoining district of Jhelum to the eastward, and 1 in Shahpur District to the South of Gujrat still further Eastward. In July a single death was reported, and that in Jhelum. In August again 1 death was reported in Jhelum District, and 1 also in Rawalpindi. In September 4 deaths were reported, all in

Rawalpindi. In October, again in Rawalpindi District, 20 deaths were reported, and in the same month 2 occurred in the Jhelum and 6 in the Gujrat Districts. In November, again in Rawalpindi, 3 deaths were reported; and after this no other deaths from cholera occurred here during the rest of the year. Total deaths, Rawalpindi Division, 46. In the southern districts of this part of the Province—a region which usually enjoys a happy immunity from cholera visitations—a single death was reported in the Muzaffargarh District in October. In the same month a series of 3 deaths was reported in a single village in the Bannu District on the Southern borders of the Peshâwar Division; no death from cholera in this district had been reported since the preceding December, when 16 were registered in connection with the great epidemic of last year. In the districts of the Peshâwar Division single deaths were reported in April and June in Peshâwar. In July also single deaths were reported in Peshâwar again and in Hazára. In August 30 deaths were reported, all in Peshâwar District. In September 7 deaths in Peshâwar, and 1 in Hazára Districts; and in October again 76 in the former and 3 in the latter. Finally in November 51 deaths were reported, all in the Peshâwar District. Total 172 deaths.

Disease gradually spread up-country from the South-eastern Districts.

26. From this analysis of the above statement it would appear that the disease gradually spread up-country from the South-eastern districts, increasing in activity and intensity as it advanced towards the North-west. But this is only apparently and partially, and not really and fully, the case. For although cholera was certainly present in however slight a degree, in only the Eastern districts during the first half of the year, and more markedly so in only the Western districts during the second half of the year, as will be seen by a glance at the vertical disposition of the figures in the several columns of the above tabular statement, the increased mortality during the latter period did not occur in point of time in the same order as the sequence of the districts.

Sudden activity of the disease first manifested by the outbreak in the Peshâwar District.

27. The sudden activity of the disease, contrary to the usual experience, was first manifested by the outbreak in the Peshâwar District without any very marked premonitory signs shewing themselves in the districts to the South-eastward; whilst the mortality caused by the disease in the Rawalpindi group of districts was of subsequent date, and directly connected with the movement of large bodies of troops, camp-followers, and travellers passing through them on the march down-country from Peshâwar, where they had already become affected with cholera.

This will be more clearly understood from the following brief history of the disease in the several districts affected from Peshâwar downwards to Lahore. I will only here premise that the deaths reported from cholera afford no index to the actual, or even approximate, number of individuals attacked by the disease, nor indeed does the number include all the deaths really caused by cholera. This is owing to the fact that the disease is seldom recognised till some case ends fatally with suddenness and violence of symptoms; and even then the milder attacks occurring at the same time and in the same locality are rarely recognised as in any way connected therewith. In fact the malady which is produced by the action of the cholera influence is not sufficiently recognised by the profession as cholera until, or unless, it manifests the symptoms of the last or most fatal stage of the disease, whereas, especially in epidemic seasons, it affects in a mild and moderated degree a vastly greater number than it kills by the severity of its assaults.

Statement shewing diffusion of cholera chronologically and locally in the rural circles in the district of Peshâwar during the year 1880.

Name of rural circle affected with cholera.		Population.	Total number of villages in each rural circle reporting deaths from cholera.	No. of villages reporting deaths from cholera.	Number of cholera deaths registered during the year.	Date of 1st death.
Badbair	R. C.	21,253	24	3	3	26th April.
Rajar	R. C.	34,139	49	1	1	18th June.
Matra	R. C.	7,878	39	1	1	30th July.
Tangi	R. C.	19,106	25	3	30	12th August.
Katlang	R. C.	19,213	44	1	1	23rd ,,
Chahar Sadah	R. C.	30,268	27	4	4	25th ,,
Sawabi	R. C.	39,016	40	1	1	18th September.
Peshâwar	T.	58,430	50	1	118	26th ,,
Akora	R. C.	12,443	32	1	1	16th October.
Khazana	R. C.	20,055	69	1	1	21st ,,
Matani	R. C.	7,473	14	2	6	7th November.
TOTAL ...		269,274	413	19	167	

The outbreak at Tangi as reported by Surgeon-Major Adam Taylor, Civil Surgeon of Peshāwar.

29. On the 15th August the Civil Surgeon, Peshāwar, telegraphed to the Government, Punjab—"Police report thirteen deaths from cholera August 13th and 14th." The Secretary to Government, Punjab, with his Memo. dated Simla, 16th idem, forwarded copy to Sanitary Commissioner, Punjab, for information. In reference to this telegram I addressed this office No. 2974 of 18th August, to the Civil Surgeon, Peshāwar, requesting he would "be good enough to make full enquiries regarding the outbreak, noting particularly the sanitary and meteorological conditions under which the disease made its appearance at the place, and communicate the result of his enquiries to this office at his earliest convenience."

Following this, agreeably to the instructions of the Punjab Government, I proceeded to "Peshāwar in order to ascertain by personal enquiry the state of the outbreak of cholera in Tangi, and advise the Government regarding the danger to be apprehended from the influx of troops which is shortly about to take place."

On arrival at Peshāwar on the 23rd August, the report of which a copy is subjoined was furnished to me by Surgeon-Major Adam Taylor, the Civil Surgeon.

C. No. 300.

"I have the honor to state that I yesterday visited the village of Tangi in consequence of a report that had been sent by the Police of the occurrence of an outbreak of cholera at that place. I found, when I arrived, that epidemic cholera broke out on the 11th instant, and that the Police records shewed the following return of seizures and deaths to the 16th :—

Date.		*Cases.*	*Deaths.*
12th	... ...	8	5
13th	... ...	6	3
14th	... ...	4	3
15th	... ...	12	5
16th	... ...	3	1
	Total ...	33	17

There had been several fresh cases during the night of the 16th and 17th which had not been entered. Altogether I suppose there had been forty seizures, of which about half were fatal.

General cases seen.

(2). I saw five or six recent cases, all in the algid or collapse state, and some four or five of the earlier ones which had recovered or were recovering.

First cases.

(3). The origin of the outbreak I was not able to determine. The first case was a woman from Eusafzai who had been living in a house on the outside of the village, and who told me that she had been visited by a great number of coolies and travellers who were in the habit of coming to her hut. On their arrival she was taken ill on the 11th and when I saw her was convalescent. The next two cases, fatal ones, occurred on the 12th in two huts separated from one another, and from the hut of this month (woman ?) by only a partition-wall, there being free intercourse between the residents of all.

Cholera general.

(4). After this the disease became general and I saw cases of cholera in all quarters of the village.

Importation from foreign territory probable.

(5). Rumours of cases having occurred in Panghir (Pranghar ?), a large village some five miles off in foreign territory, reached me, and I also heard that 3 cases had occurred among the coolies employed on the canal. I think it probable that the woman taken ill on the 11th August contracted her malady from the *musafers* (travellers) with whom she was thrown in contact. She undoubtedly served as a focus whence the disease spread to the village in general.

Strangers seen with cholera.

(6). In support of my opinion that the malady was originally imported by the coolies, I found two strangers lying in the streets (with cholera), who had apparently crawled into the village with the disease on them. They were utterly unknown to the people, who looked on them with the utmost apathy, and did nothing to help them ; one old man who had a broken pot with water in it by his side, but the other, a boy of 13 or 14, was even unprovided with anything to drink ; the marks of disease and the beaten down dust and sand shewed too plainly what was the matter with him, had his aspect not been sufficient, and the struggles which the agony of his cramps had induced.

Canal Doctor away.

(7). The Native Doctor attached to the canal was not at his post, so I had to leave with the *Thanādar* (Police officer) a note for him giving orders about the management of the sick, &c. I have besides written to the officer in charge of the canal works for the services of this Native Doctor.

Directions for a hospital.

(8). I directed that there should be a place set apart for the accommodation of destitute strangers and others who might be seized with cholera in the village or in its vicinity—a house to be taken on the outskirts of the village for the purpose, that it should be furnished with cots and necessaries—that a *bhisti* (waterman), *mihtar* (sweeper) and cook should be entertained, and I left directions for the Native Doctor to superintend the temporary hospital.

Sanitation.

(9). I directed that the filth-litter about the place should be burned, and the place made as clean, and kept as clean, as possible, and the *Thanadar* promised that the printed circular directions regarding the sanitary management of cholera cases should be thoroughly carried out.

Short Sanitary Report.

(10). I cannot close this without describing the state of Tangi. It is a large straggling village of about 3,000 houses, and at a rough guess 10,000 inhabitants ; the huts are low mud hovels of most wretched construction and appearance, are filthy and ill ventilated, and as all the cattle are kept inside during the night, their floors are saturated with dung and urine of beasts, and the small amount of air they contain poisoned with every manner of abominable exhalation.

No conservancy.

(11). There are no attempts at street or domestic conservancy, the mud of which the huts are built has been dug out promiscuously from any handy spot inside the village, which is thus honeycombed with pits about 10 feet or so deep of all shapes and sizes ; these often contain a pool of putrid fermenting water in which animal remains lie festering, or if dry serve as privies and cesspits.

Animal refuse in the streets.

(12). All the refuse, dead animals, dung, manure, bones, offal, &c., lies just where it is thrown out (it never being removed), to rot away among the houses.

Puddles.

(13). The refuse water from the wells, all the drainage and sewage of the place collects in black stagnant puddles in the streets, where it is converted into a putrid organic mixture by the addition of the above-mentioned excrementitious matters.

Water.

(14). The water-supply is from a branch of the canal. There are wells from 15 to 60 feet deep, but all the deep wells are too brackish for drinking purposes. I believe there is only one sweet-water well.

Conclusion.

(15). In conclusion, if it be possible, which I don't admit, that cholera should be spontaneously generated as (by ?) filth, I have never seen any place more favorable to such an origin ; or if it be necessary that the disease should be introduced from without, I have never seen a place more certain to foster its development, aid its growth, or further its diffusion than Tangi."

I have, &c.,
ADAM TAYLOR,
Civil Surgeon, Peshâwar.

Copy of a letter dated 24th August from Sanitary Commissioner, to Secretary to Government, regarding the outbreak.

30. On the following day I addressed a letter to the Secretary to Government, Punjab, of which the following is a copy :—

Peshâwar, *24th August* 1880.

SIR,—Referring to your D. O. letter of 19th instant, I have the honor to report for the information of the Honorable the Lieutenant Governor, that I left Simla on the 21st instant, and arrived here yesterday afternoon, and the same evening despatched to your address the telegram of which a copy is herewith enclosed.

From the report furnished to me by Dr. Taylor, the Civil Surgeon, and from the Police reports received up to noon yesterday, it appears that the sudden outbreak of cholera in Tangi continues to be confined to that village, and to be rapidly on the decline. No cases of cholera have been reported from any other part of the District, and I am informed by the Principal Medical Officer at Jalalabad, in reply to a telegraphic enquiry, that there was " no cholera with the force returning from Kabul, and none reported from surrounding districts." The general sanitary condition of the Peshâwar cantonment under the present exceptional circumstances is fairly good so far as conservancy arrangements are concerned, and both the city and surrounding villages are free from any unusual amount of sickness. The season, however, is now approaching the time when the endemic fever of the valley frequently manifests itself in sudden outbursts of violent cases which so closely simulate cholera, as to be barely distinguishable from that disease, though they are not usually of so fatal a nature, and I therefore am of opinion that it is most desirable that the troops now returning from Kabul should not be detained a day longer than is absolutely necessary in this valley, but that they should be passed on across the Indus as quickly as may be. In order to facilitate their passage and prevent overcrowding on the road by Attock, I would advise that a portion of the force be moved onwards by the Kohât route to Rawalpindi, or direct to Jhelum, as I telegraphed in my message yesterday.

The several camp-grounds will require to be tended with more than ordinary care, and I would recommend that the local authorities be warned by telegraph to perfect their sanitary arrangements by the temporary entertainment of an extra staff of sweepers, and the daily destruction by fire of all camp litter and latrine soil, especially where the latter is not systematically trenched.

To-morrow I purpose inspecting the city and suburbs, and should fresh cases of cholera be reported from Tangi, I will proceed to that place and inspect its condition, though on this point I think Dr. Taylor's report is sufficiently clear."

I have, &c.,
H. W. BELLEW,
Sanitary Commissioner, Punjab.

A further report on the same subject by Sanitary Commissioner.

31. Two days later I left Peshâwar for Tangi, and on my return thence to Mardan despatched the letter of which subjoined is a copy to the Secretary to Government, Punjab.

" *Mardan, 28th August* 1880.

SIR,—In continuation of my letter of the 24th instant, to your address, I have the honor now to report, for the information of the Honorable the Lieutenant Governor, that I returned to this place from my visit to Tangi and Abazai this morning. At Tangi I was informed yesterday that no fresh cases of cholera had occurred there during the preceding two days, but in the evening, when at Abazai, the Native Hakím came over to tell me that a fresh case had been reported at the Police station subsequent to my departure from the village. At Tangi I saw five patients, 1 man and 4 women, who were reported to me as convalescents from cholera. Two of these were in their own houses, and the others in the cholera hospital.

History of first case.

The first case I saw was a man aged 26 years, and named Juma, who was said to have been taken ill with cholera when at Peshâwar city on the 18th instant, and to have been at once brought home to Tangi by his friends. I found him looking delicate, and with a slight yellow tinge in the eyes. He was up and about, and shewed no signs of emaciation. His own account of himself was, that he was suddenly taken ill with violent headache and ardent fever, accompanied by a slight diarrhœa and somewhat violent vomiting of bilious matter which quickly induced a state of collapse or faintness. In this state he was conveyed back to Tangi and recovered in a couple of days.

The next case was that of Rokdi, a Hindu woman aged 25 years, who had been taken ill at Tangi on the 18th instant, with fever, vomiting, and slight purging, which last continued for 2 days. When I saw her, on the morning of the 27th instant, she was lying on a *charpoy*, was fat and plump, and shewed no signs of any recent severe illness. Her pulse was natural, and tongue and eyes in good condition. She complained only of weakness, was free from fever, and had had no return of vomiting and purging for 5 or 6 days.

The other three cases were all women in the cholera hospital, erected outside the village. Two of them were in very good condition, and had each an infant at the breast. Neither shewed any signs of emaciation or recent severe illness, though both had suffered some 6 or 7 days previously from a sudden attack of fever with some vomiting and purging which lasted for 2 or 3 days. The third woman was in a very weak and emaciated condition, and was still suffering from a painless watery diarrhœa. She was a beggar from beyond the border (from Totai), and appears to have been in a state of semi-starvation for some months past. She was in a state of low fever.

In none of these five cases did I find any signs of the disease commonly called cholera, and distinguished by violent vomiting and purging, and cramps and suppression of urine, though it is possible they may have all presented these symptoms before my arrival.

Reason for considering this sudden outbreak to be an aggravated form of the common endemic fever of the Peshâwar valley.

The District Hakím, Syfud-dín, furnished me with a tabular statement of all the cases that had occurred in Tangi from the first outbreak of the disease up to the date of my visit. From this it appears that there had been a total of 64 seizures from the 12th to the 27th August inclusive, and that 30 of the number had ended fatally ; many of them within 24 hours of being taken ill. From what I saw myself and from what I heard from the people of Tangi, as well as from others at Nowshera, Mardán, and Abazai, I am inclined to consider this sudden outbreak to be an aggravated form of the common endemic fever of the valley, which is well known occasionally to be attended with more or less sudden and violent vomiting and purging which produce a collapse resembling that of epidemic and virulent cholera, though usually not of a like fatal character.

The remarkable feature of the outbreak, as brought to our notice by the Police reports, is its restriction to the one village of Tangi ; but this I think is more apparently than really the case, for I heard of several deaths from a similar train of symptoms having occurred in some villages in the neighbouring districts beyond the border, as well as in different parts of the Peshâwar valley, mostly isolated cases in each place.

In Tangi, a District Hakím (or native physician) being on the spot, a careful register of every seizure and death has been kept, and every case has been reckoned as cholera in which either the symptom of vomiting or purging, or both together, was present. Of the 30 deaths recorded, 9 were of strangers who had come to Tangi in the course of business or else as beggars, 5 from across the border, and 4 from adjoining parts of the district, *viz.*, one each from Umarzai, Utmanzai, Harichand, and Katlang.

Some of these deaths I am inclined to attribute to heat apoplexy, as I understand from the Khan of Hotí, who is a very intelligent native gentleman, that sudden deaths from exposure to the sun are by no means of uncommon occurrence at this season of the year amongst travellers and labourers in the fields.

Sanitary defects and suggestions.

Tangi is a large village of about 1,600 houses, and is the market town of the trans-frontier districts of Lower Swat, Utmankhel and Mahmand, and is consequently much frequented by a greater or less number of strangers. At the time of my visit I found the main streets of the town crowded with Mahmands and Utmankhels who had just arrived from across the border with some scores of bullocks laden with mats, cordage and other merchandize; and amongst them I noticed some very poor people who were evidently come in search of labour and food.

The village of Tangi covers a considerable area, and is irregularly laid out. I had not time to go through the whole place, but inspected the three divisions next to the Police Station. These I found to be in a very neglected state as to sanitation, and the *Thanadar*, who accompanied me with the principal *Maliks* (headmen) and others, assured me that the whole village was in the same filthy state. There were no signs of any attempt at conservancy. Large pits were found here and there, amidst the groups of dwelling-houses, as the common receptacles of all manner of filth, garbage, and ordure; the courts of the private dwellings were entirely unswept, and many of them contained great dungheaps; the lanes in some parts were traversed by foul slimy sewers which had no outlet or proper channel, but trickled their crooked course along the surface as its slope favored gravitation.

The unsanitary condition of this great and prosperous village is highly discreditable to the *Lambardárs* (headmen) and of itself dangerous to the health of its inhabitants. The present occasion I think offers a good opportunity for its thorough cleansing under the direct orders of Government. I would recommend the removal of all dungheaps from the interior of the village to fixed and enclosed sites outside, and the filling up with fresh earth of all the pits and hollows now existing amongst the mass of houses, and a general sweeping and cleaning up of the streets.

This once effected, the *Lambardárs* should be held responsible that the villagers thereafter should remove the sweepings, &c., of their houses to the sites or enclosures provided outside the village.

Recommends that the troops returning from Kabul be not delayed in the Peshâwar valley longer than is avoidable.

In my previous letter, noted in the outset of this report, I stated for the information of Government, my recommendations regarding the rapid passage of the troops returning from Kabul across the valley to the other side of the Indus. I have now only to state that I still recommend that these troops should not be delayed in the Peshâwar valley longer than is avoidable, for though the disease I have just now investigated is not in my opinion the virulent epidemic cholera, it might assume that form with a change in the atmospheric conditions such as favor its development in a tract of country possessing the known physical defects of the Peshâwar valley in respect to its natural drainage and ventilation; and more especially amongst large bodies of troops on the march, exposed as they necessarily must be to the effects of a trying season, coupled with the risks of the road and the dangers of personal or individual indiscretions.

Satisfied as I am that the authorities, both civil and medical, at Peshâwar are on the alert, and watchful to meet emergencies as they may arise in connection with the course of this disease, I see no necessity for my further stay here, and therefore purpose returning to Head Quarters unless anything unforeseen should occur to detain me.

I have, &c.,
H. W. BELLEW, SURGEON-MAJOR,
Sanitary Commissioner, Punjab.

History of cases that occurred in the Peshâwar District prior to the outbreak at Tangi.

32. Two or three days later I returned to Head Quarters. Only two deaths from cholera in Tangi were reported after my departure from the place; one of these, though not reportd till the 4th September, had occurred on the 21st August; the other occurred on the 1st September.

I have stated in the above letter that at Mardan and elsewhere "I heard of several deaths from a similar train of symptoms having occurred in some villages in the neighbouring districts beyond the border, as well as in different parts of the Peshâwar valley, mostly isolated cases in each place." As regards British territory the general correctness of the rumours I had heard is well substantiated by the independent testimony of the statement given below, which has been compiled in this office from the returns received during the year from the various Police Stations (Registration circles) in this district. From this statement it will be seen that isolated deaths from cholera occurred during August in each of the villages of Umarzai and Ganderah (reported in September) in the Tangi circle of registration,—of Chaharsadah, Prang, Turangzai, and Utmanzai in the adjoining Chaharsadah Circle, and of Balandi in the Katlang circle away under the hills to the Eastward.

Statement shewing deaths from cholera registered in the Peshâwar District during the year 1880. *Peshâwar District population* 500,443; *Area, sqr. miles* 2,504; *Population to sqr. mile* 271; *No. of Rural circles* 19; *No. of villages* 730.

Name of Police Station.	Number of villages.	Name of town or village.	Population.	Date of first death.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Date of last death.	Total deaths.
Badbair ...	24	Achhar ...	622	19th Octr.	...	...	...	...	...	...	...	...	...	1	...	...	...	1
		Landi Yargaju	1,145	26th April	...	...	...	1	...	...	...	...	...	...	...	...	...	6
		Musazai ...	1,740	19th Octr.	...	...	...	...	...	...	...	...	...	1	...	...	...	1
Rajar ...	49	Bedian ...	214	18th June	...	...	...	...	...	1	...	...	...	...	...	...	...	1
Matra ...	39	Karah ...	226	30th July	...	...	...	...	...	...	1	...	...	...	...	...	...	1
Tangi ...	25	Tangi ...	7,269	12th Aug.	...	...	...	...	...	...	...	24	2	...	...	...	1st Sept.	21
Ditto ...		Umarzai	3,378	18th „	...	...	...	...	...	...	...	1	...	...	...	...	...	1
Ditto ...		Ganderah		31st „	...	...	...	...	...	...	...	...	3	...	...	...	4th Sept.	3
Peshâwar ...	50	Peshâwar ...	58,430	26th Septr	...	...	...	...	...	...	...	...	1	72	45	...	17th Nov	118
Chaharsadah	27	Chaharsadah	6,522	25th Aug.	...	...	...	...	...	...	...	1	...	...	...	...	...	1
Ditto ...		Prang ...	677	26th „	...	...	...	...	...	...	...	1	...	...	...	...	...	1
Ditto ...		Turangzai ...	3,778	27th „	...	...	...	...	...	...	...	1	...	...	...	...	...	1
Ditto ...		Utmanzai ...	3,110	25th „	...	...	...	...	...	...	...	1	...	...	...	...	...	1
Katlang ...	44	Balandi ...	100	23rd „	...	...	...	...	...	...	...	1	...	...	...	...	...	1
Sawabi ...	40	Kedi ...	857	18th Septr.	...	...	...	...	...	...	...	...	1	...	...	...	...	1
Akora ...	32	Akora ...	2,486	16th Octr.	...	...	...	...	...	...	...	...	...	1	...	...	...	1
Khazana ...	69	Pajagi ...	393	21st „	...	...	...	...	...	...	...	...	...	1	...	...	...	1
Matani ...	14	Matani ...	1,031	8th Novr.	...	...	...	...	...	...	...	...	...	...	1	...	...	1
Ditto ...		Azakhel ...	1,974	7th „	...	...	...	...	...	...	...	...	...	...	5	...	11th Nov.	5
Total ...	413		93,952		...	...	...	1	...	1	1	30	7	76	51	...		167

But these, as will be seen from the statement, were not the first deaths from cholera reported in the Peshâwar District. Single deaths from this disease were reported from Landi Yargaju, two miles to the South of Peshâwar city, and in the Badbair Circle in April—on 26th, a woman, age 25 years, after 5 days' illness—from Bedian in the Razar Circle, 40 miles due East of Tangi, and 52 miles North-east from Peshâwar city, in June—on 18th, a man, age 60 years, after 10 hours' illness—and from Kárah in the Matra Circle, 24 miles due North from Peshâwar, and 13 miles South of Tangi, in July—on 30th, a man, age 35 years, after 2½ days' illness. Kárah is situated between Peshâwar and Tangi in the Doaba of the Swat and Kabul rivers, the former separating it from Tangi, and the latter from Peshâwar.

In each case the subject was a resident and died in his own home. The distances are approximate being measured on the map straight across from place to place.

The last of the above reported deaths, on the 30th July, was followed by the outbreak in Tangi on the opposite side of the Swat river, the first death from cholera there occurring on the 12th August, and the last on the 1st September, the number of deaths from cholera reported between these dates being 26. As the epidemic subsided in Tangi, it made its appearance fatally in the neighbouring village of Ganderah, about 2 miles to the Eastward, where two old women, aged 60 and 80 years, respectively, died of cholera on 31st August, after 15 hours' illness in each case. The next and last death reported from cholera in this village occurred on 4th September, in a man aged 35 years, who died after 24 hours' illness. All three were residents of the village.

History of cases in other parts of the Peshâwar District.

33. After this no deaths from cholera in the Peshâwar District were reported till the 20th September (civil population alone here dealt with), on which date a man aged 40 years was reported to have died on the 18th September, after two days' illness, in the village of Kedi in the Swabi Circle, adjoining that of Razar, and about 20 miles South-east from Bedian in that circle, where a single death from cholera was reported on 18th June. He was a resident, and died in his own home; date of seizure 16th September.

Again, no death from cholera was reported in the Peshâwar District till the 26th September, on which date a man aged 45 years died of that disease in the Civil Dispensary at Peshâwar. He is described as a traveller, native of Tirah beyond the border, who was taken ill in the Mandi (grain market), and carried to the dispensary where he died on the 26th September, after being under treatment for several days. This is the case of the Afridi mentioned in para. 2 of letter No. 385 of 4th November 1880, from Civil Surgeon, Peshâwar, to Deputy Commissioner, Peshâwar, copy of which is subjoined hereafter.

But before noticing the outbreak in Peshâwar itself, let us see what information we have regarding cholera in other parts of the district.

Whilst the disease was active in the city throughout the month of October and there killed 72 of its inhabitants in that month, it is credited with only 4 deaths in all the rest of the district during the same period.

The first of these deaths occurred on the 16th October in the village of Akora on the grand trunk road, 31 miles due East from Peshâwar, and about 10 miles by road from the Indus at Attock. The victim was a young man aged 20 years, a resident of the place, who died after 4 days' illness.

The second occurred on the 19th October in the village of Achhar, Badbair Circle, about 2 miles South by West from Peshâwar. The victim, a boy aged 4 years, a resident, who died after only 4 hours' illness.

The third death occurred on the same date in the village of Musazai, about 3½ miles due East from Achhar, and in the same registration circle. The victim, a man aged 30 years, a resident, who died after 3 days' illness.

The fourth and last of these deaths occurred on the 21st October in the village of Pajjagi, Khazana circle, about 4 miles North-east from Peshâwar. The victim, a man aged 22 years, a resident, who died after only a few hours' illness, being seized during the night and dying in the morning.

These are the only deaths reported from cholera in rural circles during the month of October in the whole of the Peshâwar District. But in the city the activity of the epidemic continued unimpaired throughout this and the early part of the following month, after which it subsided. The last death reported from cholera in the city, occurred on the 17th November, and it was the last death reported from this disease in the whole district. During these 17 days it destroyed 45 lives in the city, whilst, during the same period, only 6 deaths from cholera were reported from all other parts of the district.

All these deaths occurred in the Matani circle of registration,—one in the village of Matani itself, 14 miles due South from Peshâwar, and the other 5 in the village of Azakhel, 3½ miles due East of Matani. The first of these deaths occurred on 7th November in Azakhel—a woman, aged 22 years, after 24 hours' illness. The second, third, and fourth deaths occurred on the following day, *viz.*, in Matani, a man, aged 42 years, after 3 days' illness, and in Azakhel two boys, aged 14 and 4 years, respectively, each within 24 hours of seizure. The fifth death occurred on the 10th November and the sixth on the following day, both in Azakhel,—the first a woman aged 25 years, the other a boy aged 4 years, in each case after 3 days' illness. All were residents and died in their own homes.

History of the outbreak in the Peshâwar City as reported by Dr. Taylor.

34. The history of the outbreak in the city is thus recorded by Surgeon-Major A. Taylor, Civil Surgeon, Peshâwar, in his letter No. 385 of 4th November 1880, to the Deputy Commissioner, Peshâwar:—

"I have the honor to report that cholera first appeared in the city of Peshâwar this autumn on the 28th August 1880, in the person of a Hindu, a servant of a Commissariat *Gomashta* (agent), who had come down from Kabul about 10 days before his attack by the disease. The symptoms were well marked, but he recovered, and there were no cases apparently in sequence of this one.

The next case was that of an Afridi, who was taken ill in the new *Mandi* (the same locality in which the Bokhariots were living) on the 20th September. He exhibited all the signs of cholera, of which he died. He was one of a Jirga (representative assembly) from Tirah ('the name of a district in the Afridi hills South of the Khyber Pass and West of Peshâwar). Two of the same Jirga were also seized with cholera, but were removed by their friends ; one died. These men all stated that cholera existed in the *Tirah* valley and had been present there since last year. This was, however, contradicted by the Political Officer connected with the party, who declared that the influential men absolutely denied the existence of the disease in their country.

Outbreak amongst the Bokhariots.

A *Mochi* (cobbler) named Ghulam Jellani, who used to work on an archway in the *Mandi* over which the Prince of Bokhara lived, was reported to have died of cholera on the 2nd October, and one or two other cases of supposed cholera occurred in the Mandi, and in other parts of the town. I think it an established fact that after the arrival of the *Tirah* Jirga, and their residence in the place, the Mandi became affected. Syad Abdul Malik, Prince of Bokhara, has been at Peshâwar for the last 9 or 10 months. He lived in the neighbourhood of the Mackeson, or new Mandi, occupying, himself and personal attendants, a double-roofed gateway and the room above the arch of the gateway known as Nazir Khairulla's Serai. It is situated to the East of the square. The Prince's wife and family lived in the Harem, a Government house, a little to the southward of the Mandi, in a bye street, known as Mirza Hussain Ali's Hawaili. The followers, grooms, &c., lived in a garden belonging to Rai Lakpat Rai, and called after him. It is close to the *Mandi* to the North in the large street running towards the Bajawari gate of the city. They numbered about 40 men ; the rest of the establishment, about 10, lived on the gateway or Harem.

On the evening of the 11th October they were all well except that they had cases of fever. That day 30 or 35 of them ate of some *Kechri* served in one Dusterkhwan (dinner tray), the elder son of the Prince, Torajan, eating with them. The Prince himself spent the day in the Harem and ate of food cooked there. About midnight, between the 11th and 12th, 9 of the followers, a Police constable, who had dined with them, on duty at the garden, and the Prince's son were seized with cholera, of which they all eventually died. On the 13th another child of the Prince's was taken ill inside the Harem. On the 14th a third, and on the 15th, a female attendant, who was watching and nursing the children, was also taken ill and died ; 14 cases in all, and all ending fatally.

The *Kechri* which formed the meal, and after partaking of which the outbreak took place, was made in the usual way from dall and rice bought in the bazar. All enquiries have failed to shew that this *Kechri* could have been infected with cholera matter. The cook is alive and well. Only about half of the whole number who ate of it were seized. The fact of the boy Torajan being taken in the Harem and infecting the locality as caused (proved ?) by subsequent seizure of his sister, brother, and nurse is significant. It has been alleged that copper poisoning from the *degchi* used in the preparation of the food might have been the cause of the fatal illness of these people, but the facts of the case are not incompatible with this supposition. The water used by the Bokhariots was taken from a well in the garden, or from the Bara river.

The Mandi which occupies the centre of the area affected, is a large square with streets running through it. It is largely resorted to by outsiders and is full of animals of burthen, and is necessarily much littered and befouled.

The house occupied as the Harem is large, open, and well ventilated, with a spacious yard.

The garden is untidy, ill kept, and dirty. I regret very much that I cannot make out a clearer history. Most of the above facts have been elicited by Assistant Surgeon, Thakur Das, after a patient and lengthened enquiry, but the case is one of peculiar difficulty, owing to the jungli wildness of the people, and their not being able to speak any intelligible (to me) language. Since the outbreak there have been cases in the city daily, sometimes 4 or 5, sometimes 1 up to 13 in one day (that is of known cases). Sometimes it drops to one or two, and for three days none were reported ; but the disease still goes on, and on the 3rd November 8 cases were detected."

Summary of total deaths registered from cholera in the Peshâwar district.

35. This completes the list of deaths reported from cholera in the Peshâwar district during the year 1880, exclusive of Army and Jail Statistics. The total number is 167 from the first death reported as occurring on 26th April, to the last on 17th November. Of this number 26 occurred at Tângi between the 12th August and 1st September, giving an annual death-rate from this cause of 3·5 per mille of the population ; three occurred in the neighbouring village of Ganderah between 30th August and 4th September ; 118 in Peshâwar from 26th September to 17th November, annual death-rate of 2·01 per mille of city population ; five at Azakhel between 7th and 11th of November ; and the remaining 15 in as many different villages between the 26th April and 8th November. That is to say 5 rural circles (inclusive of one town circle), out of 19 in the district returned deaths from cholera, and 14 villages out of a total of 730 in the district.

The incidence of this mortality upon the general population will be seen at a glance by reference to the tabular statement given at page 20 para. 32 of this report, which shews the population and area of the district, the population per square mile, the number of villages in each Registration Circle and the population of each place reporting deaths from cholera. The mortality, it will be observed, is greatest in the most populous places.

Cholera present in Peshâwar at a much earlier date than that mentioned by Dr. Taylor.

36. Before passing on to notice the further history of cholera in this district in connection with the influx and passage of troops during the period of the epidemic, there are one or two points requiring consideration in the above report on the outbreak in Peshâwar city by Dr. Taylor.

First I would note that cholera appears to have been present in Peshâwar at a much earlier date than the first case mentioned by Dr. Taylor, though it may have failed to attract attention by any violent or sudden mortality, for the first of the convalescents seen by me at Tângi, as already stated (para. 31, page 19), was said to have been taken ill with that malady on the 18th August, whilst on a visit in the city of Peshâwar.

Comparison between the outbreak amongst the Bokhariots, and a parallel case which occurred at Delhi in 1871, as reported by Dr. Fairweather.

36. Next I think the details of the outbreak amongst the Bokhariots are very noteworthy, particularly for comparison with a somewhat parallel case which occurred at Delhi during the cholera outbreak there in 1871, the particulars of which are given in the Sanitary Report for that year, by Dr. Fairweather, the then acting Sanitary Commissioner, Punjab. For convenience of reference I transcribe in this place the main points of that report in the form of a brief abstract.

In 1871 cholera was quiescent in the Punjab, the total deaths registered being only 369. "During the greater part of the year the few scattered cases recorded were chiefly reported in remote rural circles. * * * * The disease was making some havoc in Lucknow during the months of October and November, but there was no indication of its nearer approach, till, on the night of the 28th and morning of the 29th November, it burst very much like a thunder-clap in a clear sky on one of the suburbs of Delhi. The suddenness and violence of the outbreak may be judged from the fact that, within a very few hours, and in a very circumscribed locality, 47 men, women, and children were seized, of whom 13 were found dead in their houses shortly after sunrise, and 2 more had died before sunset."

On receipt of telegraphic intelligence of the outbreak, Dr. Fairweather proceeded to Delhi, and arrived there on the evening of the 1st December. "Since, even during that short interval," he states, "the disease had nearly expended itself, * * * * * little remained for me to do but to trace out the origin of the outbreak, as far as possible."

The circumstances which attended the outbreak were peculiar, and "may be briefly stated to be the isolated nature of the spot where it broke out, the confinement of the disease not only to certain small groups of houses in this locality, but mainly to a certain caste, and to a few others who had joined in a feast given by a man of this caste only two days previously."

The site of the outbreak forms the South-west portion of the Sadr Bazár suburb of Delhi, which is situated on the West side of the city, about 400 or 500 yards distant from its Lahore gate. It is "occupied almost entirely by a class employed in tanning and working in leather," and "is separated from the Sadr Bazár by a shallow sandy nalláh, and the ground on which it stands is elevated somewhat above the bazár, being formed by a projection of the rocky ridge which exists in the neighbourhood of Delhi. The houses, which were of the usual mean order used by people of this class, were built of mud or of the rough stones strewn about on the neighbouring ridge, and the ground on which they stood was formed of little but the bare rock, with only a few inches of gravelly soil, and *debris* covering it." This locality, "though inhabited principally by men occupied in tanning and leather work, has also a smaller body of weavers, *Kanjars*, and *Nats*, &c., interspersed." Those employed in tanning are called *Reghar*, and those in leather work *Chamar*; "their trade is a very filthy one, and the ground around their huts is strewn with the bones of dead animals * * the carcasses being left to be devoured by wild animals," whilst the small court-yards of the houses are "occupied by the pits in which the skins are tanned." This having been the state of matters for many years, "the whole of the locality has become saturated with filth, and the stench proceeding from it was quite overpowering."

On the 26th November 1871, a man of the Reghar caste gave a feast on occasion of the death of his brother, who had died on the 20th instant. The feast was almost entirely confined to the Reghar community, the only exceptions being a few of their neighbours, the Kanjars and Nats, none of the Chamars being inivted. The feast was attended by "several hundreds" of the male portion of the Reghar caste, and "having eaten their fill, they each carried home portions of the food to their wives and children, so that nearly every man, woman, and child of the tribe partook of it." This was on the 26th November. "Nothing occurred until the evening of the 28th, when some of them began to be seized with vomiting and purging, and by the following morning (29th), 47 had been seized with all the symptoms of virulent cholera, of whom 13 were found dead in their houses when the outbreak was discovered."

The daily seizures and deaths connected with this outbreak are given as follows :—

Days.		*Attacked.*	*Died.*
From 6 P. M. 28th to 6 P. M. 29th November	... ...	47	15
,, ,, ,, 29th ,, ,, ,, 30th ,,	... ...	3	8
,, ,, ,, 30th ,, ,, ,, 1st December	... ...	14	8
,, ,, ,, 1st ,, ,, ,, 2nd ,,	... ...	6	7
,, ,, ,, 2nd ,, ,, ,, 3rd ,,	... ...	1	2
,, ,, ,, 3rd ,, ,, ,, 4th ,,	... ...	2	5
,, ,, ,, 4th ,, ,, ,, 5th ,,	... ...	0	0
,, ,, ,, 5th ,, ,, ,, 6th ,,	... ...	0	0
,, ,, ,, 6th ,, ,, ,, 7th ,,	... ...	0	1
	Total ...	73	46

"With the exception of the two cases which occurred on the 4th December," one a merchant from Bikanir who on his way through Delhi lodged not far from the scene of the outbreak; the other a woman who resided at no great distance from the Reghar locality—"the attacks were exclusively confined to the Reghar caste, and to the few outsiders who joined in their feast." How many of these last partook of the feast was not ascertained, but of the number "one Kanjar, two Nats, and two sweepers were attacked; the Kanjar and two sweepers being among the very first of the victims," whilst a Chamar girl "who had eaten a portion of the food which was given to her by a Reghar, was seized, and died on the 1st December."

Enquiry elicited that "the food consisted of rice, *múng dal* (a species of lentil much eaten in India), ghí (or clarified butter), sugar, and spices;" that portions of the different articles which remained over what had been cooked were of perfectly good quality; and that several "dogs were fed for some days exclusively on these articles without any appearance of being affected injuriously thereby." The food was cooked in three large tinned copper vessels, which, on inspection, were found to be "not so well tinned as they might have been, although," says Dr. Fairweather, "they were not worse than many I have seen in use without bad consequences; and, moreover, the symptoms of the disease were too plain to admit of their being confounded with those of copper poisoning."

As "the result of this enquiry afforded no clue whatever to the origin of the disease," attention was directed to the quality of the water-supply. Dr. Fairweather "spent a considerable time in endeavouring to trace the disease to that source," and though chemical analysis shewed the water of seven selected wells to be more or less seriously contaminated, ultimately he "was obliged to abandon the idea that the outbreak could have originated from this cause." At the same time Dr. Fairweather records the fact that the specimen of water characterized by Dr. Center, the Chemical Examiner, as "abominable and difficult to understand how it could be drunk," was that of "the well from which the water was taken to cook the rice and other articles for the feast;" and also the fact "that it was largely used by other people in its neighbourhood without bad consequences."

Further investigation elicited the fact that cholera was actually present in the city of Delhi several days prior to this outbreak. The first case discovered was on the 27th November, Mr. M., a photographer, who had left Lucknow on the 25th of November, "where cholera was then prevalent, and where an acquaintance of his, whose house he often visited, had recently lost a child from that disease," having arrived (after staying a night at Cawnpore on his way), at the Dák Bungalow in the city, about 7 P. M. of the 26th, and being "seized with all the symptoms of cholera" about 8 A. M. the following day—that is to say, the day before the feast was given. Next it came out on enquiry that the man on the occasion of whose death this feast was given, himself died under symptoms of cholera on the 20th November, though his death was registered under the head of fever. His surviving brother told Dr. Fairweather that deceased "had been in perfect health up to the evening of the 19th November, that he had eaten a hearty evening meal, and had gone to bed, but that in the middle of the night he was seized with vomiting and purging, and died before mid-day on the 20th." In connection with this enquiry it was discovered that the food for the feast was piled on a "chatái" (palm-leaf mat) spread upon the floor of the room in which the man, on the occasion of whose death the feast was given, had died, and who had vomited and purged on that floor.

On further inquiry it was discovered that at least three cases of recognized cholera had come to the knowledge of the Native Doctor of the Sadr Bazár Dispensary, all prior to the outbreak, and in the vicinity of the same locality. The earliest of these was treated as genuine cholera on the 18th November, other cases of supposed cholera had been reported by the police, the earliest death returned as cholera having occurred on the 3rd November, another on the 8th, and a third on the 20th. It is clear therefore that a series of isolated cases of cholera were occurring in Delhi and its suburbs immediately prior to the outbreak among the Reghar community.

Conclusion that the consequences of the feast in each case cannot be attributed solely to the food eaten or to the vessels in which it was cooked.

37. Now in both these remarkable outbreaks, that among the Reghars in Delhi in November 1871, and that among the Bokhariots in Peshávar in October 1880, there are two parallel sets of circumstances which attract attention. In each case the outbreak occurred immediately, or shortly, after partaking of a feast, the food in both cases being of the same kind, and cooked in the same sort of tinned copper vessels. What influence may have been due to the food itself, or the vessels in which it was cooked, in the production of the symptoms that characterized both outbreaks, it is impossible to determine with any accuracy. There are certain considerations, however, which may help to explain the manner in which such symptoms might be produced either through the action of copper poisoning, or that of rancid butter alone, or of both combined. And as a matter of fact such instances, on a smaller scale usually, are not unfrequently met with in the ordinary experience of domestic life in this country, as when an entire household is upset with a similar train of symptoms through partaking of food cooked with rancid *ghí* (native preserved butter) or decomposed butter, or food cooked in a badly tinned copper vessel.

But in the outbreaks now under consideration it is clear that the consequences of the feast in each case cannot be attributed solely to these causes—possible causes—for in each instance the outbreak was attended by another parallel set of circumstances wholly unconnected with the feast, namely, the presence of some general influence which produced the occurrence of other and usually isolated cases of a similar nature, both at the same time and in the same locality.

Thus we find in the Delhi District in 1871, even under the very imperfect registration of ten years ago, that not only was cholera present in the city for some weeks prior to the outbreak there of the disease towards the close of November, but that two deaths had been registered there from that disease in May, and isolated deaths in the district towns of Sonepat and Faridabad in February and March, respectively, again two deaths in Sonepat in May, and isolated deaths in the rural circles in April, May, June (2), and September. Similarly we find in the Peshávar District in 1880, that not only was cholera present in the city for several weeks prior to the outbreak there on the 12th October, but that, as has been stated in detail on the preceding pages, isolated deaths from cholera had occurred in different parts of the district, together with an outburst at Tangi, during the preceding months; whilst, as will be stated further on, the disease had already broken out amongst the troops in the adjoining cantonment a full month before it attacked the Bokhariots.

From a consideration of facts above recorded, it would appear that both these outbreaks owed their severity to some special cause present in the air.

38. Taking these facts into consideration, it would appear that both the Delhi outbreak of 1871, and the Peshâwar outbreak of 1880, the season in each case being non-epidemic, owed their severity to some special cause operating to aggravate the action of some general influence, whatever its nature may be, present in the air, and which influence only manifested itself in such localities and individuals as it found possessed of the suitable conditions. On both occasions these unknown suitable conditions, as evidenced by the occurrence of cholera cases, were present both at Delhi and Peshâwar, and in each place the action of the cholera influence was intensified and aggravated by some exceptional cause, which in these instances was probably immediately connected with the food or utensils employed in the feasts immediately preceding the violent outbursts.

My object in dwelling upon these two outbreaks and comparing the circumstances attending their occurrence is to draw attention to the serious manner in which cholera influences, even in non-epidemic seasons, may be aggravated by accidents or indiscretions which pre-dispose the individual to an attack of the disease. In the case of the Peshâwar outbreak, there is no doubt that the sudden violence of the disease amongst the Bokhariots was largely due to the action of some cause connected with the meal of the preceding day, operating to aid that of the existing and active cholera influence. For the disease though it did not attract attention in the city prior to this outbreak had nevertheless been present there as early as the 18th August, and had appeared amongst the troops in cantonments a full month before the Bokhariots were attacked.

Cholera amongst troops in Peshâwar.

38. The first intimation of cholera amongst the troops was by telegram from the Deputy Commissioner, Peshâwar, to the Punjab Government, dated 9th September 1880. "Five cases cholera 9th Regiment last night in cantonments, heavy rain this morning. The Regiment cannot move into camp to-day." This I may here note was the first fall of rain in Peshâwar since the preceding July. On receipt of a copy of this telegram I addressed my No. 15 S., dated Simla 10th September 1880, to the Secretary to Government, Punjab, of which copy is subjoined.

> "Sir,—With reference to your memo. of yesterday's date forwarding copy of telegram from Deputy Commissioner, Peshâwar, reporting the outbreak of cholera in the 9th Regiment at that station on the 8th instant, I have the honor to state, for the information of His Honor the Lieutenant Governor, that I think it highly advisable that, so far as is compatible with military requirements, the troops now returned from Afghânistan should be marched across the Indus as soon as possible, and not be detained in the Peshâwar valley longer than is necessary. The Regiments in which the disease may make its appearance should be marched into camp towards the high ground along the course of the Khattak hills, and not towards the low ground along the courses of the Kabul and Swat rivers.
>
> I have, &c.,
>
> H. W. BELLEW,
>
> *Sanitary Commissioner, Punjab.*"

Other cases continued to occur amongst the troops in the cantonments and in camp, but the disease did not appear in the Khyber Pass till towards the end of the month, when the first cases occurred at Ali Masjid on the 27th, and at Lundi Kotal on the 29th September. The annexed tabular statement shews the meteorology of the year at Peshâwar. I have no particulars of the history of the disease amongst the troops, though I am aware that several cases of cholera occurred amongst the Regiments, both European and Native, whilst on the march down-country from Peshâwar to their several destinations in India. But that the disease did not spread along the routes taken by them in the Punjab is very certain, as will be seen from the history of the disease in the other districts.

Monthly abstract of the Meteorological observations registered in the Peshâwar Station during each month of the year 1880.

MONTH.	*Barometer.*	*Hygrometer.*	*Temperature of Radiation Solar.*	*Temperature in the Shade.*			*Thermometer.*	*Rain Gauge.*
	Mean.	Relative Humidity.	Mean.	Mean maximum.	Mean minimum.	Mean daily range.	Mean temperature.	Rainfall in inches.
January	28·908	45	124·0	68·2	37·6	30·0	53·9	...
February	28·878	46	126·1	63·7	39·9	23·8	51·8	1·18
March	28·763	35	149·5	88·0	56·4	31·6	72·2	...
April	28·640	28	155·0	94·7	62·7	32·0	68·7	0·11
May	28·502	27	160·1	102·8	70·8	32·0	86·8	0·52
June	28·319	29	161·8	110·2	80·5	29·7	95·3	0·42
July	28·375	44	154·8	103·3	78·1	25·2	90·7	1·65
August	28·446	41	157·5	101·5	77·5	24·0	89·5	...
September	28·625	45	151·5	94·7	68·0	26·7	81·3	1·39
October	28·784	32	147·8	91·0	56·4	34·6	73·7	...
November	28·933	40	133·5	77·6	44·5	33·1	61·0	...
December	28·971	57	121·2	66·7	38·2	28·5	52·5	...

CHOLERA IN THE RAWALPINDI DISTRICT.

Statement shewing diffusion of Cholera chronologically and locally in the different Towns and Rural Circles in the District of Rawalpindi during 1880.

Name of Municipal Town or Rural Circle affected with Cholera.		Population.	Total number of villages in each rural circle reporting deaths from cholera.	Number of villages reporting deaths from cholera.	Number of cholera deaths registered during the year.	Date of 1st death.
Gujar Khan	R. C.	50,068	145	3	5	2nd March.
Jatli	R. C.	95,456	155	1	1	22nd August.
Attock	T.	18,412	37	1	1	15th September.
Hassan Abdal	R. C.	32,149	77	2	16	19th ,,
Rawalpindi	T.	93,147	224	1	8	11th October.

Cholera in the Rawalpindi District.

39. The deaths reported from cholera in this district amount to 31 during the year. They occurred between the 2nd March and the 14th November. The first occurred on the 2nd March at Gujar Khan, on the grand trunk road to Peshâwar; the victim, a traveller passing through the place, was taken ill on the preceding day. In reply to enquiries from this office, the following particulars of this case were furnished by the civil Surgeon, Rawalpindi, through the Police Officer. "Name, Tihal Singh; caste, Hindu; age, 25 years; pulse, none; voice, hoarse; urine, complete suppression; constant vomiting and purging; cramps in legs; face and bowels blue; great thirst. Died on 2nd March. Was seen by Hospital Assistant Sunder Singh."

No other death was reported in this district till the 20th May, on which date a man aged 45 years, named Jamâla, a Musalmân, died at his own home in the village of Pharwal, situated a little way off the road, and about 4 miles to the north-west of Gujar Khan. His symptoms were similar to those above described, and he died the day after being taken ill. Enquiry elicited that a few days later another case of cholera occurred in the same house. The patient, a woman named Basri, recovered.

The third death from cholera was reported from quite the opposite direction. It occurred on the 14th June in the village of Lahore, about 14 miles due east from Gujar Khan, and 5 or 6 miles off the road. The victim, a Musalmân, named Kâlu, and aged 15 years. He had returned home from a visit to Gujar Khan, was taken ill the same night, and died on the second day.

Again, no other death was reported here from cholera till the 22nd August, on which date a Musalmân named Budha, aged 18 years, died of the disease after two days' illness, at his home in the village of Natha Chatra, in the Jatli Circle, and about 12 miles south-west from Gujar Khan. He is not stated to have left his village prior to the attack.

The report of the next death from cholera was received only on the 9th October, though the death occurred on the 15th September at Gondal, a village on the trunk road, about 8 miles from Attock on the Indus; a Hindu, aged 35 years, a resident of the place; duration of illness, one day.

This was followed by the reports of a cholera outbreak at Hassan Abdal on the grand trunk road. It was almost wholly confined to the camp followers with the troops (affected with cholera) marching down the road from Peshâwar. The camp-ground here is situated on the bank of a rivulet, the site lies low, and is damp and ill ventilated. The first death occurred here on the 19th September, and was followed by single deaths on the 21st, 22nd, 25th, and 27th September, all amongst men, camp followers with the troops, except that on the 25th. The victim in this case was a woman, named Basari, aged 20 years, a resident of the place. She died after two days' illness. Of the others, the two first died after a single day's illness, the third after four days' illness, and the last after six days' illness. So that the seizures in all the cases took place about the same time, or between the 18th and 20th September, supposing that the initial stage of malaise has been unrecognized by the reporter. The next death from cholera here occurred on the 2nd October, in a police constable who died of the disease after 9 days' illness. His case may likewise be included in the above category.

No other death from cholera was reported here till the 10th October, on which date 6 men died of the disease. They were all camp-followers, and all died within twenty-four hours of seizure.

The next and last death from cholera reported here occurred on the 17th October, in a resident of the place, named Alam Sher, aged 40 years, who also died within 24 hours of seizure.

Total 13 deaths from 19th September to 17th October, all, except three, among the camp followers marching through.

Following the six deaths on the 10th October at Hassan Abdal, half that number, or three deaths from cholera occurred, two days later, on the 12th, in the little village of Gadhwâl, about 2 miles distant to the eastward. Two of the number were strangers, and the other a resident (a boy aged 10 years), and all died within 24 hours of seizure.

Simultaneously with these outbreaks the disease made its appearance at Rawalpindi, the first death there occurring on the 11th October. The man was a Hindu, aged 21 years, a stranger from Haripur in the Abbott-abad District, and died in the City Dispensary after 3 days' illness. The road from Haripur to Rawalpindi passes through Hassan Abdal.

No other death from cholera was reported here till the 25th October, on which date two deaths and again on the following day two deaths occurred. All four were strangers, and all died within 24 hours of seizure, namely, 1 in the Dispensary, 1 in Sarái Tahal Dás, and 2 in Ganj Mahalla. On the 31st October the first death amongst residents of the place was reported. He died in the City Dispensary, after 2 days' illness. A week later, 7th November, the next death from cholera was reported. It also occurred in the Dispensary, in a stranger after 7 days of illness. The next and last death reported from cholera here occurred in Surahan Mahalla of the city, in a resident named Muhammad Hasan, aged 30 years, who died on the 14th November after two days' illness.

Besides these a European guard of the P. N. S. Railway construction was attacked with cholera at Tarnal, about 6 miles west of Rawalpindi, on the 9th October, and died the same day in the Royal Artillery Hospital at Rawalpindi.

Statement shewing diffusion of Cholera chronologically and locally in the different Towns and Rural Circles in the District of Jhelum during 1880.

Name of Municipal Town or Rural Circle affected with cholera.	Population.	Total No. of villages in each Rural Circle reporting deaths from cholera.	No. of villages reporting deaths from cholera.	No. of Cholera deaths registered during the year.	Date of 1st death.
Dinah ... ... R. C.	28,177	112	5	5	13th June.
Sohawa ... ... R. C.	16,805	72	1	1	7th October.
Jhelum ... ... T.	60,540	170	1	1	15th Do.

Cholera in the Jhelum District.

40. In this district a total of 7 deaths was reported during the year. The first occurred on the 13th June, and the last on the 15th October. All isolated deaths in as many different localities, and all on the line of the grand trunk road or its vicinity. Five of the number occurred in the Dinah registration circle, namely, at Ladhar, on the 13th June, a woman named Nawáb Bibi, aged 20 years, after 2 hours' illness; at Said Husen, on 22nd June, a man named Hasan Ali, aged 70 years, after one day's illness—he is described as an emaciated old man, a stranger from Kashmir territory; at Korlah, on the same date, 22nd June, an old man of 80 years, named Himáyat, after a few hours' illness; at Maldeo, on 25th July, a woman named Nurbhari, aged 60 years, after 2 days' illness; and at Katanah, on 28th August, a young woman named Hasho, aged 22 years, and a resident of the place, after one hour's illness.

The other two occurred at Pindi Matta Khan in the Sohawah Circle, on 7th October, and in the town of Jhelum on the 15th October, respectively. The former case was that of a man named Maddat, aged 60 years; the other of a man, named Jewan Singh, aged 30 years, who died on the second day after seizure.

CHOLERA IN THE BANNU DISTRICT.

Do. in the Bannu District.

41. Only 3 deaths from cholera were reported in this district during the year. They all occurred in the town of Esa Khel during the month of October. The first on 15th October, a boy, aged 6 years, after 10 hours' illness; the next on the 18th, a woman, aged 30 years, who died 19 hours after being taken ill; and the last on the 20th, a woman, aged 32 years, after 13 hours' illness. All were residents of the place, the two first Musalmáns, the other a Hindu.

Statement shewing diffusion of Cholera chronologically and locally in the different Towns and Rural Circles in the District of Hazára during 1880.

Name of Municipal Town or Rural circle affected with cholera.	Population.	Total number of villages in each rural circle reporting deaths from cholera.	Number of villages reporting deaths from cholera.	Number of cholera deaths registered during the year.	Date of 1st death.
Karbalian ... ... R. C.	4,625	40	1	1	16th July.
Haripur ... ... T.	15,715	144	3	3	21st September.
Abbott-abad ... ... C.	2,894	1	1	1	2nd October.

Do. in the Hazára district.

42. Altogether 5 deaths from cholera were reported in this district during the year. All isolated deaths in as many different places.

The first death reported occurred in the village of Badorah, Karbalian Circle, on the 16th July, a Musalmán, named Sherah, aged 60 years, after 3 days' illness. The next two deaths occurred on the 21st September, both were in male drivers of the 6th Regiment, P. I., and both died the same day as attacked, one in the dispensary at Haripur, the other in Hospital at Abbott-abad. Both were taken ill on the march. The other two deaths also occurred on the same day, a week later, on the 27th September, one at Dhaddah, the other at Abdullapur. The former case was that of a woman, Zebo, aged 70 years; the latter of a man, Husen, aged 85 years. Both were residents and both died within 24 hours of being taken ill.

CHOLERA IN THE GUJRAT DISTRICT.

Statement shewing diffusion of Cholera chronologically and locally in the different towns and Rural Circles in the District of Gujrat during 1880.

Name of Municipal Towns and Rural Circles affected with cholera.		Population.	Total No. of villages in each rural circle reporting deaths from cholera.	No. of villages reporting deaths from cholera.	No. of cholera deaths registered during the year.	Date of 1st death.
Gujrat	T.	154,896	265	1	1	5th May.
Kharian	R. C.	83,205	230	1	3	14th October.
Lala Musa	R. C.	71,130	206	2	3	18th „
Total ...		169,231	701	4	7	

Do. in the Gujrat District.

43. Seven deaths from cholera were reported in this district during the year. The first on the 5th May, the last on the 24th October, during which month all but the first occurred. The first death on the 5th May occurred in the town of Kunjah, Gujrat Circle, in a Musalmán boy, aged 7 years, a resident of the place, who died the same day that he was taken ill. Of the others, 3 deaths occurred in the village of Kharian, on the 14th, 19th and 20th October, respectively; all three were in camp-followers with British troops on the march down-country from Peshâwar; and all died the same day as attacked, the two first in the Sarái, the other on the camp-ground.

Of the remaining 3 deaths, one occurred on the 20th at Lala Musa Parao in a resident of the place, a man, named Gurh, age 35 years, who died the same day as attacked; the other two occurred at Lala Musa Daulat Nagar, one on the 18th, the other on the 24th October; in both cases the victims were troopers of the 14th Bengal Cavalry on furlough, and each died on the 3rd day of illness.

CHOLERA IN THE LAHORE DISTRICT.

Statement shewing diffusion of Cholera chronologically and locally in the different Towns and Rural Circles in the District of Lahore during 1880.

Name of Municipal Town or Rural Circle affected with cholera.		Population.	Total No. of villages in each rural circle reporting deaths from cholera.	No. of villages reporting deaths from cholera.	No. of cholera deaths registered during the year.	Date of 1st death.
Khudian	T.	40,104	108	1	1	31st March.
Lahore	T.	181,450	13	1	3	4th April.
Kasur	T.	82,860	127	3	5	21st „
Mangtanwála	R. C.	44,827	195	1	1	18th June.
Raiwind	R. C.	19,264	47	1	1	20th „
Khalrah	R. C.	40,892	52	1	1	9th July.
Shahdara	R. C.	33,061	87	1	1	11th October.
Lahore Suburbs	R. C.	59,211	68	1	1	16th December.
Total ...		501,669	697	10	14	

Cholera in the Lahore District.

44. In this district altogether 14 deaths from cholera were reported during the year. The first occurred on the 31st March, and the last on the 16th December.

Taken in the order of occurrence, the first death took place at Khudian on the 31st March, in a resident of the place, a man named Jiwan Singh, aged 55 years, who died 6 hours after being attacked. Following this, in April, 2 deaths occurred in the city of Lahore, one on the 4th and one on the 19th; the former in a man named Natha, age 45 years, Musalmán, who died in Jogian Mohalla 8 days after being taken ill, and the latter in a woman, named Ramkour, age 70 years, Hindu, who died in Kucha Kalian Dás, within 24 hours of seizure. In the same month, besides these, a third death occurred at Lahore on the 14th, amongst the European residents. The next and last death reported in April occurred on the 21st at Kasur, in a resident of the town, a woman named Mahi, age 20 years, Musalmán, who died 3 days after being taken ill.

In May one death from cholera was reported. It occurred in the city of Lahore, in the Mori Gate quarter; a Hindu woman named Bishun, age 40 years, resident, one day ill.

Two deaths were reported in June; one on the 18th, at Thatta Esa, Mangtanwala Circle, a woman named Salan, age 30 years, Musalman, who died almost immediately after attacked; the other on the 20th at Bhattah, Raiwind Circle—a man named Jiwan, age 60 years, Hindu, a resident, who also died almost immediately after he was attacked.

Only one death was reported in July. It occurred on the 9th at Gaga, Khabra Circle, when a woman named Raju, age 20 years, Hindu, resident, died within 24 hours of being taken ill.

No other death from cholera was again reported till October, during which month 5 deaths occurred in different quarters, besides one on the 4th amongst the European community at Lahore, namely, on the 11th at Rakh-baoli, Lehna Singh, Shahdara Circle, and about 4 miles west of Lahore city, an unknown stranger found on the roadside, a Musalman, age about 50 years; on the 18th at Sodarpur, Kasur Circle, a Hindu, name Maya, age 48 years; on the 20th at the same place, a Hindu, name Ditta, age 50 years; and on 21st again at the same place, a Musalman, name Mahtab, age 60 years; none of these men were residents, they had come on business of their own from different neighbouring places, and all three died within 24 hours of being taken ill; on the 20th again, at Phallah, Kasur Circle, Piranditta, age 13 years, Musalman, a resident, died on the same day as taken ill.

After these the next and last death reported from cholera occurred on 16th December at the village of Sanda in the Lahore Suburbs,—a Musalman boy, age 6 years, on 4th day of illness.

The cases referred to as having occurred amongst the European civil population of Lahore are the following;—On the 14th April Jane D————, a little girl aged 3½ years, and on the 4th October Mr. ————, a Railway employé, aged 36 years. With reference to the history of the last case Dr. J. E. B. Brown, Principal of the Medical College, Lahore, favored me with the following particulars in reply to enquiry on my part. "I have ascertained the following facts about Mr.———— the Railway employé, who died of cholera in the Mayo Hospital on October 4th. Mr. ————was a Welshman, and four months ago he acted as Assistant Station Master at Jhelum on the P. N. S. Railway, but was then discharged for drunkenness, and came to Lahore, where he became Assistant Station Master to the S. P. and D. Railway, and lived in Muhalla Sultán Sarai near the Lunda Bazár; but a month ago he moved to Mr. F————'s house between the Railway Station and Mayo Hospital. There they say he drank spirits very much till the evening of October 2nd, when he had no money. On that day he took the greater part of a bottle of Eno's Fruit Salt, and the next morning, October 3rd, he drank a bottle of Harvey's Sauce. Nevertheless he was well during the day and ate a hearty dinner, but at night he was attacked with violent diarrhœa and vomiting and at last fainted. He was taken to the Mayo Hospital on October 4th at 5 A. M. I saw him at 8 A. M. in a collapsed state, able to talk, with violent cramps, suppression of urine. He died at 1 A. M. (P. M. ?). The next morning a *post mortem* was held, the intestines appeared like those of cholera. The contents of the stomach were sent to the Chemical Examiner, but no irritant poison was found."

Conclusion drawn from facts above recorded.

45. Now from the account given in the preceding pages the following facts in connection with cholera in the Punjab during 1880 appear to be clearly established:—

First: that cholera was present in a sporadic form in the Eastern Districts of the Province during the whole year, and that it manifested itself in a more active form from April to Novr. in the North-Western Districts.

First, that the influence which produces cholera, as evidenced by the occurrence of isolated deaths reported under that head from different quarters, was present in the Eastern Districts of the Province during the whole year in a sporadic form; and that it manifested its presence in the North-western districts in a more active form only from April to November inclusive, during which period it caused some sharp local outbreaks.

Second: that the occurrence of the local outbreaks was coincident with the influx of strangers subjected to exposure and fatigue.

Second, that the occurrence of these local outbreaks at Tangi, Peshāwar, Hassan Abdal, and Rawalpindi was coincident with the influx into those places of large bodies of strangers who were subject to the exposures and fatigues inseparable from the march and camp life at a trying season of the year. In the case of Tangi, the strangers being merchants, labourers, and beggars from the adjoining famine-stricken districts beyond that portion of the frontier; whilst in the cases of the other places they were British troops—European and Native—and their camp-followers returning to India from field service in Afghanistan.

Third: that in each case the outbreak was of a strictly local nature.

Third, that in each case the outbreak was of a strictly local nature and nowhere spread amongst the general populations around, as is evidenced by the fact that, with few exceptions, the entire mortality reported from cholera in the region lying between Gujrat and Peshâwar, during the period subsequent to the outbreak at the latter place, occurred amongst the strangers travelling thence along the trunk road towards India.

Fourth: that those subjected to the influence of cholera carried it with them as far Eastward as Gujrat and no further.

Fourth, that whilst the disease did not spread amongst the resident populations along the route of the travellers, neither did it follow even those affected by it in the Peshâwar valley further Eastwards than Gujrat. In other words, that the crowds of human beings who were subjected to the influences of cholera at Peshâwar, and were there affected by the disease, carried it with them as far Eastward as Gujrat and no farther.

Concluding remarks and the inference drawn from a study of facts above recorded.

46. From the facts thus recorded, the following inferences may be drawn, namely, that the influence, whatever may be its nature, which produces cholera, finds a favorable field for activity amongst crowded assemblages of human beings, especially when subjected to causes which tend to impair the sound health of the individual, as, in the instances under consideration, by exposure to the fatigues and privations of the march; but that the disease is dependent for the manifestation of its activity upon the presence of some other unascertained circumstances connected with the condition of the atmosphere, and probably the soil also, of the locality in which it breaks out. That is to say, these unascertained conditions of air and soil act as exciting causes, whilst the other ascertained conditions act as the direct predisposing causes of the disease. In other words, that without the presence of the exciting causes the predisposing causes alone are incapable of producing the disease.

But whether these deductions be correct or not, the lesson we learn from the facts recorded in connection with the behaviour of cholera in the Punjab during the non-epidemic year of 1880, is the same—on a small scale, and therefore more easily comprehended—as that we have been taught by all previous visitations of the disease; namely, that its assaults are to be staved off quite as much, if not more, by precautions on the part of the individual as by general measures of sanitation directed towards the improvement of the air, soil, and water about the sites of human habitation. For there is abundant testimony furnished by every visitation of the disease to prove that however perfectly and assiduously general measures of sanitary precaution are carried out, they fail to counteract or avert the action of the epidemic influence in the air.

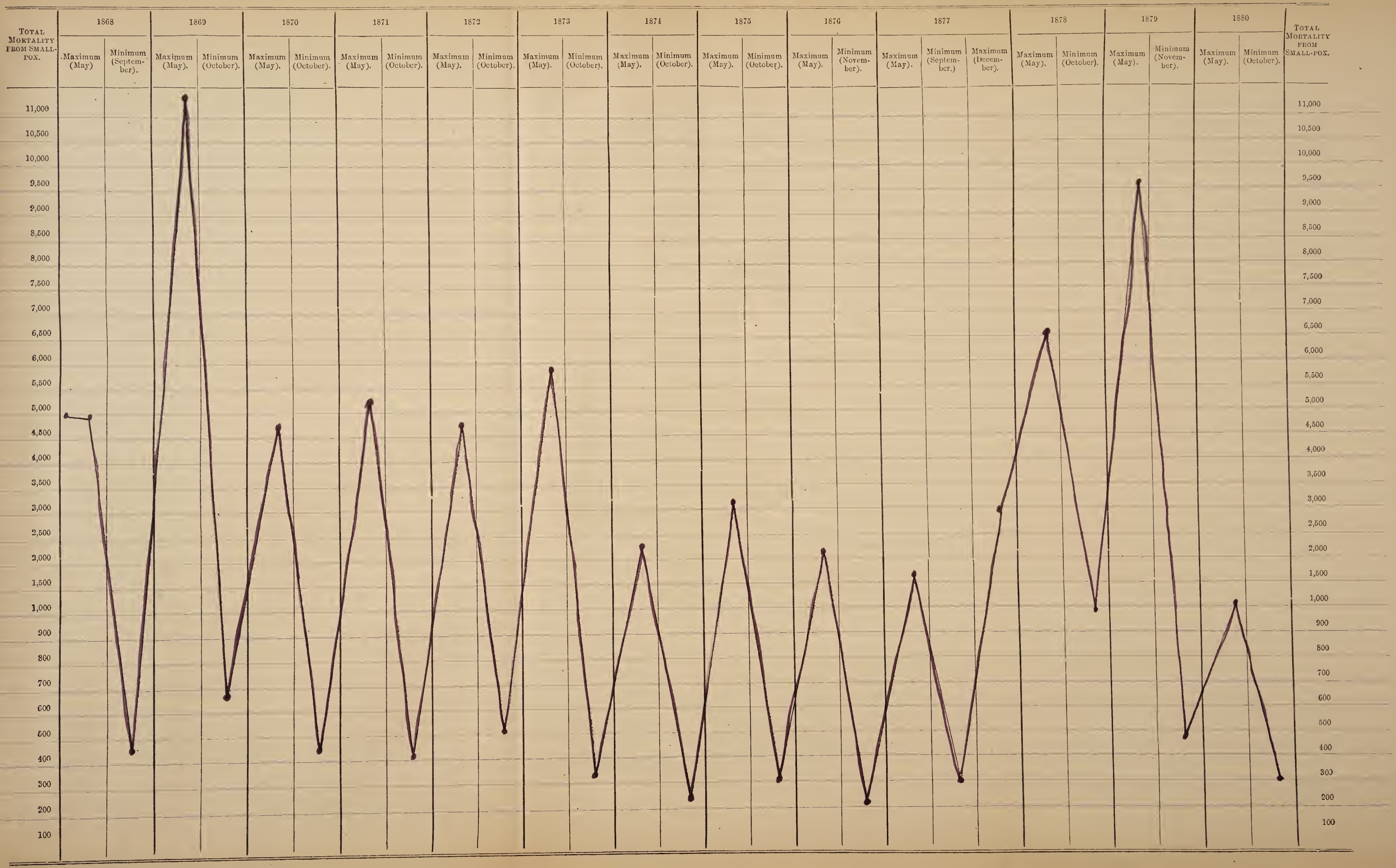
Contrast, for example, the sanitary condition of our European barracks with their costly and elaborately planned details for the preservation of health, against that of the ordinary dwellings of the general population of the country, with their mean, ill-ventilated, and over-crowded hovels, beset with filthy surroundings, and an absolute neglect of even ordinary sanitation. Yet when cholera comes it punishes both alike with impartial severity, nay, if anything, the well kept barrack more severely than the neglected hovel.

To avert cholera, therefore, we should not content ourselves by reliance solely on attention to the measures required for maintaining our centres of habitation and our dwellings in the most perfect sanitary condition attainable—measures which on their own merits should at all times, and more particularly in seasons of epidemic sickness, receive most careful and constant attention—but we must also personally and individually aid the good effects of these measures, by the exercise of judgment and discretion; by, at least, fair treatment of our own bodies and persons, and not, as is too often the case, thwart and counteract them by direct acts of indiscretion; by injudicious and careless conduct.

I have above given, in the case of a death from cholera at Lahore, an instance—an extreme instance, but none the less of no uncommon occurrence—of indiscretion and unfair treatment of the body inducing an attack of cholera at a time that the disease was abroad in the locality in a sporadic form. And I have no doubt that many parallel instances would be discovered on investigation amongst the fatal cases of cholera which occurred amongst the troops and their followers on the occasion of their being affected by the disease at Peshâwar and along the line of their march thence.

The outbreak amongst the Bokhariots in Peshâwar city is another instance of the disease being induced, whilst its influence was present in the place, by an exciting cause connected with the food of the sufferers. The necessity, therefore, for vigilance on the part of the individual in all that pertains to the maintenance of his bodily and vital powers in a state of health and strength is apparent; and this individual vigilance is more especially necessary in respect to eating and drinking, as much as to careless exposure to the weather, but above all in respect to excessive fatigue or exhausting exercises.

CHART SHEWING THE MAXIMUM AND MINIMUM RISE AND FALL IN THE MORTALITY FROM SMALL-POX FROM THE YEAR 1868 TO 1880, INCLUSIVE.



B.—SMALL-POX.

Mortality from small-pox in 1880 and previous years.

47. During the year under report there were only 9,145 deaths registered from small-pox, namely, 4,823 males and 4,322 females. The number of deaths registered under this head in the previous years is shewn in the statement given in the margin. From this statement it will be seen that the epidemic which proved so fatally prevalent throughout the Province during the preceding years, 1879 and 1878, very completely and suddenly subsided in the year under review, the number of deaths registered from small-pox being the lowest of any year for which we have records.

1868	...	23,759	1875	...	13,594
1869	...	53,195	1876	...	10,254
1870	...	27.163	1877	...	12,296
1871	...	25,534	1878	...	40,271
1872	...	23,728	1879	...	49,489
1873	...	25,699	1880	...	9,145
1874	...	12,026			

Of these 9,145 deaths, the number is distributed according to ages as under—

Under one year	Males	968	Females	814
One year to 12 years	„	3,445	„	3,134
Over 12 years	„	410	„	374

The districts and towns in which the highest mortality was registered during the year.

48. It will be seen by reference to Annual Form No. VIII appended to this Report, that the highest mortality from small-pox was registered in the Districts of Dera Ismail Khan and Bannu, the number in the former being 2,074 and in the latter 1,559. The next highest mortality was registered in the Muzaffargarh and Shahpur Districts, namely, 855 and 799, respectively.

In Pesháwar the number registered was 446, in Karnál 459, Umballa 448, and Hoshiárpur 368. In Simla there was no death registered from small-pox, and in the Delhi District only 1, in Hazára 4, Rohtak 9, and Gurgaon 15. In the remaining districts the number varied from 21 to 254.

Of the principal towns, Dera Ismail Khan, Dera Gházi Khan and Pesháwar suffered most from the disease, the number of deaths registered in them being 120, 49 and 49, respectively. In Karnál 19 deaths were registered, and in none of the others did the number exceed 9, whilst in several only single deaths are recorded from small-pox.

The regularity with which the maximum and minimum mortality is in each year attained illustrated in the chart.

49. The accompanying chart shews the maximum and minimum rise and fall in the mortality from small-pox in each year of the series from 1868 to 1880, inclusive. The regularity with which the maximum mortality is in each year attained in the month of May is very clearly shewn, whilst the minimum, though usually attained in October, ranges between the months of September and November. The only irregularity in the series occurs in the year 1877. In this year there were two periods of maximum mortality from small-pox. The first was attained at the ordinary period in May, and the second, which was quite exceptional, in December. This last marks the commencement of the protracted epidemic which prevailed with fatal violence during the famine years 1878 and 1879.

It is curious that this irregularity in the course of small-pox mortality should be coincident with a marked irregularity in the course of rainfall. And a comparison of the chart of small-pox mortality with the chart of rainfall seems to indicate a fixed relation between the two, between rainfall and small-pox mortality.

The charts show with remarkable regularity throughout the series that in each year the minimum rainfall is followed by the maximum small-pox mortality, and the maximum rainfall by the minimum small-pox mortality. In other words, that rainfall is unfavorable to the prevalence of small-pox, and drought favorable to the development of the disease.

This is very clearly illustrated by the exceptional circumstances of the year 1877. In all the other years of the series, we find that the decreased rainfall of the cold weather months is followed by the increased small-pox mortality, which invariably attains its maximum in May, and that the increased rainfall of the hot weather months is followed by the decreased small-pox mortality, which attains its minimum usually in October, sometimes as early as September and occasionally as late as November, but in all the series of years within this range of limit.

But in 1877 the regularity of this sequence is shown even more distinctly. In this year there was an unusually and altogether exceptionally increased rainfall in the cold weather months, and it was followed by the lowest maximum of small-pox mortality of which we have any record in this Province, though that maximum was attained at the regular period in May. Again, in this year there was an unusually and altogether exceptionally decreased rainfall in the hot weather months, and it was followed by a remarkably increased small-pox mortality, which attained its maximum for the year in December. In the next month of the following year, January 1878, after the 4th quarter's rainfall in 1877, it fell to the minimum, and again rose after the decreased rainfall in the 1st quarter of 1878, to the maximum in May according to the usual course, though attaining a much higher range, owing to the distress prevalent from scarcity of food as before stated. The succeeding fall and rise is according to the ordinary course. But the prevalence of this scarcity, coupled with diminished hot weather rainfall in 1879, kept up the prevalence of the previous year's epidemic with increased force.

The sudden and complete subsidence of the epidemic, and the enormous decline in small-pox mortality from 49,489 in 1879, to only 9,145 in 1880 the year under review, is very striking, and is, perhaps, not altogether without relation to the higher range in the cold weather rainfall of the year 1880, coupled with improvement in the price of food.

The course of small-pox mortality by months for the years 1868 to 1879.

50. The course of small-pox mortality by months for the years 1868 to 1879, inclusive, is shewn in the chart accompanying this section of my Sanitary Administration Report for last year, 1879, and bears out the comparison above made, and though there is not so distinct a sequence of rise and fall by triennial periods as is observed to exist in the case of rainfall and fever mortality, there is still traceable a tendency for small-pox mortality to sink to a minimum in every third year, as will be seen by reference to the table given in the margin at the commencement of this section, taking the triennial periods as for rainfall and fever mortality, namely, 1869 to 1871 and onwards.

The relation between rainfall and the mortality from fever and small-pox.

51. The difference in the ordinary (unaffected by exceptional circumstances) relation between rainfall and the mortality from fever and small-pox, appears to be this, namely, that while heavy rainfall is followed by increased fever mortality, it is followed also by decreased small-pox mortality, and that whilst light rainfall is followed by decreased fever mortality, it is also followed by increased small-pox mortality. The subject is worthy of attention and further study. Meanwhile our duty is to combat the ravages of each disease by their recognized remedies—proper conservancy and sanitation for fevers, and efficient vaccination for small-pox. As by the one the body is fortified against the fever producing influences of weather, so by the other is it protected against the small-pox producing contagion in the atmosphere.

Rái Bahadur Chetan Shah's zeal in enlightening the people on the advantages of vaccination very commendable.

52. Under the orders of Government, a scheme was prepared for the reorganization of the Vaccine Department on its amalgamation with the office of the Sanitary Commissioner, but, as explained in another part of this report, it was not brought into operation during the year under review. Much has been done, however, by Civil Surgeons in supervising the work of vaccination in their several districts. In my cold weather tour I found the vaccination done in the rural circles of the Dera Ismail Khan and Jhang Districts of first class character. In Jhang particularly, under the zealous and painstaking supervision of Assistant Surgeon Chetan Shah, Rai Bahadur, a very marked improvement in this respect has taken place. This Officer has shown commendable zeal in promoting the cause of vaccination, by enlightening the people of his district on the great advantages of the practice, through the medium of lectures and friendly discussion, not only on this subject but on matters of domestic hygiene immediately affecting their personal welfare. I was glad to find from the willingness of the villagers in this district to have their children vaccinated, that beneficial results have attended his efforts.

It is very desirable that other native Assistant Surgeons should adopt a similar method, taking as their guide the suggestions made, from time to time, in the Annual Sanitary Administration Reports issued from this office.

SECTION C.—FEVERS.

Charts A, B and C and other statements showing distribution of fever mortality by months, the rainfall by quarters, and principal food prices by years.

53. In my Sanitary Report for last year, I gave a tabular statement showing for the whole Province the mortality from fevers and the aggregate rainfall in inches by months, together with a supplementary statement giving the average annual prices of the principal food grains consumed by the people in this Province for the series of years from 1868 to 1879, inclusive. Also the Charts A, B and C embracing the same period, and illustrating respectively the distribution of the mortality from fevers by months, of rainfall by quarters, and of principal food prices by years.

The influences exercised by rainfall and the price current of food supply in this Province upon its fever mortality have been so marked during the year under report, and have, besides, maintained so close a uniformity with the results obtained by registration in previous years, that I have deemed it necessary to reproduce those statements and charts in this report, adding to them the figures and diagrams for the year 1880, in continuation of the whole series from the time registration was first systematically established in this Province.

Aggregate Rainfall and total of fever deaths registered in the Punjab, by months, for the years 1868 to 1880, inclusive.

MONTHS.	1868.		1869.		1870.		1871.		1872.		1873.		1874.		1875.		1876.		1877.		1878.		1879.		1880.	
	Aggregate rain-fall.	Fever deaths.	Aggregate rain-fall.	Fever deaths.	Aggregate rain-fall.	Fever deaths.	Aggregate rain-fall.	Fever deaths.	Aggregate rain-fall.	Fever deaths.	Aggregate rain-fall.	Fever deaths.	Aggregate rain-fall.	Fever deaths.	Aggregate rain-fall.	Fever deaths.	Aggregate rain-fall.	Fever deaths.	Aggregate rain-fall.	Fever deaths.	Aggregate rain-fall.	Fever deaths.	Aggregate rain-fall.	Fever deaths.	Aggregate rain-fall.	Fever deaths.
January	34·2	13,398	53·1	13,596	9·5	23,396	7·6	21,430	60·2	15,146	31·8	17,075	54·3	17,170	6·7	21,584	19·3	19,815	85·7	22,411	31·5	19,507	0 7	43,248	11·8	35,681
February	73·6	10,607	22·7	9,930	9·4	16,148	100·4	16,450	33·4	12,667	8·6	12,781	32·1	12,637	68·2	18,534	18·3	13,570	102·4	16,985	83·7	16,518	6·4	32,994	48·6	25,054
March	63 1	10,440	178 4	8,730	77·3	15,854	4·3	15,839	46·2	13,169	24·9	13,717	55·6	12,543	10·5	15,419	59·0	12,771	50·6	16,569	7·3	17,739	66·2	27,177	0·4	22,031
April	64·0	9,122	9·7	8,869	15·1	14,561	13·1	16,614	30·0	11,827	2·6	12,291	14 9	11,265	1 3	16,224	41·8	11,973	85·1	14,011	75 9	17,990	0·9	22,066	5·1	19,594
May	21·9	14,281	1·7	15,168	3·9	18,267	31·9	17,032	44·0	15,553	67·9	15,613	11 5	15,617	39·6	17,856	34·0	13,588	50·6	18,012	89·0	25,722	5·0	31,702	18·1	24,336
June	66·1	14,011	60·0	13,534	131·7	15,885	199·1	15,290	93·5	15,859	10·9	14,857	117·8	13,327	34·6	16,133	36·4	14,182	72·1	21,329	21·6	26,367	139·1	24,881	117·5	25,902
July	193·6	11,763	275·4	11,582	198·0	13,734	270·4	14,281	329·0	11,229	302·3	11,195	271·4	11,265	259 7	14,310	366·0	12,712	87·4	17,770	221·7	19,576	169 8	19,333	277·9	18,852
August	98·2	11,019	115·4	15,807	253·8	15,595	128·0	16,434	268·3	17,862	208·8	13,595	192·8	14,682	331·5	15,164	183·9	17,475	36·8	15,769	385·6	20,599	281·4	30,905	110·5	23,668
September	24·6	12,169	207 8	24,010	80·2	31,307	42·9	20,858	117·4	43,836	108·5	29,955	86·6	16,379	333 1	27,595	80·1	53,465	105·4	14,938	45·9	42,943	58·9	53,592	71·0	32,501
October	2·3	15,035	20·6	56,623	9·0	44,221	0·5	19,166	4·9	45,019	20·5	32,292	0·2	23,274	24·3	48,698	47·9	87,052	43·1	18,623	8·6	89,687	0·8	78,173	0·1	35,762
November	...	16,064	0·1	59,917	...	36,332	...	19,069	0·5	37,416	1·8	25,838	...	20,932	10·2	39,807	12·4	57,186	76·3	21,214	...	90,669	...	63,833	5·1	32,373
December	19·3	13,428	6·7	35,180	12·5	29,793	31·7	21,085	16·1	25,128	24·3	20,700	0·4	21,540	21·1	28,501	2·1	37,497	135·8	21,650	5·4	53,175	22·8	45,035	32·0	31,973
TOTAL ..	660·9	151,337	951·6	272,946	800·4	275,093	829·9	213,548	1,043·5	264,711	813·1	219,909	837·6	190,631	1,140·8	279,825	901·2	351,286	931·3	219,281	976·2	440,492	752·0	472,939	698·1	327,727

Average Annual price of principal Food grains.

	1868.	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.
Wheat	18	14	16	22	20	22	24	25	25	23	15	13	14
Rice	10	9	11	12	7	9	9	9	9	9	6	7	8
Pulses	13	9	12	16	15	19	19	19	21	17	9	10	13

Mortality in 1880 compared with previous years.

54. It will be seen by reference to the above statement that the fever mortality of the year under report shows a total of 327,727 deaths (namely, 179,757 males and 147,970 females, Annual Form No. IX), giving an annual per mille death-rate of 18·74, or two-thirds of the entire mortality of the province from all causes.

The above total mortality, compared with that for the two preceding years 1879 and 1878, shows a very considerable decrease, namely, of 145,212 and 112,765, respectively. But the figures more or less greatly exceed the total mortality from the same class of disease in any single year of the series back to 1868, with the exception only of 1876 (the exceptional causes producing excessive fever mortality on this occasion are described in my Sanitary Report for that year), and the average mortality of the whole series, excepting 1876, by no less than 95,807 deaths.

The causes to which the higher mortality in 1880 are due.

55. This higher mortality in the year under report is attributable partly to the marked improvement which has taken place in the registration of deaths since the introduction, at the commencement of this year, of village chaukidárs' memorandum books, together with the improving supervision exercised over rural circle death returns by District Surgeons, as shown in their inspection reports, copies of which have been submitted, with the Sanitary Commissioner's remarks and recommendations, for the orders of Government from time to time as they have been received in this office.

But the greater portion by far of this higher mortality is due to the after effects of the very severe autumnal fever epidemics of the two preceding years, coupled with the continued high prices of the principal food grains. The reason for attributing the abnormally high fever mortality of 1880 to the after-effects of the preceding years of famine, drought and epidemic fevers is that no wide-spread epidemic prevalence of this class of disease has been observed to occur in any part of the province during the year; the reports from District Surgeons unanimously pronouncing the year 1880 as having been exceptionally free from epidemic prevalence of fevers,—an immunity which was also recorded in their reports for 1877.

The monthly rise and fall in the fever mortality.

56. The mortality from fevers registered in the first four months of 1880, it will be seen, is very unusually higher than that registered in the corresponding months of the whole series of years preceding 1879. At the same time it shows a gradual and steady decline from the high figures of the last four months of the preceding year, when the fever mortality of the autumnal epidemic period reached its maximum in the month of October. After the usual decline in April and July with the intermediate rise in May and June, the mortality again commenced to rise according to rule to the higher figures of the autumnal fever season.

The first decline to a minimum mortality was in April, when the deaths registered fell to 19,594 from 78,173 in the preceding October. The second fall was to 18,852 deaths in July from 25,902 in the preceding month, thus indicating a complete subsidence of the last remains of the preceding year's epidemic.

Further, it will be noticed that in the autumn months of 1880 there is no sudden rise in the mortality as is observed to be the case in epidemic years. And this is in accordance with the tendency of fever mortality in this province to decline to a minimum in every third year.

The regularity with which the mortality from fever rises and falls in the autumn season.

56. This curious fact is well illustrated in Chart A, and is a point deserving of attention. By reference to the Chart it will be seen that the rise and fall of fever mortality in the autumn season throughout the series of years from 1868 to 1880,—the period for which we have statistics,—shows a very remarkable regularity. And this notwithstanding the influence of exceptional circumstances which have interfered to alter the normal course.

But the most remarkable fact illustrated by this chart is the steady triennial periodicity in the rise and fall of autumnal fever mortality.

A corresponding triennial periodicity is observed to exist in respect to the aggregate rainfall, as will be seen by reference to Chart B.

And a most remarkable relation is found to exist between the two, namely, autumnal fever mortality and aggregate rainfall, as I have attempted to illustrate in Chart D.

The relation between the aggregate rainfall and autumnal fever mortality.

57. The relation between the aggregate rainfall and autumnal fever mortality is constant. And where the regular course is thrown out by abnormal mortality, whether higher or lower, the causes are found to be dependent on food supply in the one case, and defective monsoon rains in the other, as will be explained later on.

First let us look at the Chart A. It presents two prominent features which attract particular attention, namely, the very steady regularity in the rise and fall of fever mortality in each year of the series, and the regularity in the rise and fall of autumnal fever mortality in each triennial period of the series.

In each year, it will be observed, there are two periods in which fever mortality reaches its maximum with marked regularity. and in which it falls to its minimum with like regularity. The maximum mortality in each year, after the cold weather rains, is attained in May or June, and after the hot weather rains, in October or November. The corresponding minimum fever mortality occurs in July or August and in March or April respectively. But the mortality from fevers after the summer rains is vastly in excess of that consequent on the winter rains. This periodical rise and fall of fever mortality in each year, it will be observed, is constant and regular, whatever the circumstances affecting its amount, whether they operate to increase the mortality to an excessive degree, or to reduce it below the normal average.

Chart showing the regularity of the periodical maximum and minimum fever mortality in each year.

58. In each triennial period, it will be observed, there is a very steady and regular decline from a maximum autumnal fever mortality in the first year to a medium mortality in the intermediate year, and a minimum mortality in the third year; and this whether the autumnal fever mortality be high or low in the triennial period.

The chart, it must be borne in mind, shows not the amount of maximum fever mortality for each year (this is affected by the mortality in the months immediately preceding and following the months of maximum mortality), but only the period of maximum fever mortality in each year. The regularity of this periodical maximum fever mortality is, throughout the whole series of years, broken only by the exceptional mortality in the autumn of 1876, which, as described in my Sanitary Report for that year, was owing to altogether exceptional causes--to the violent floods and inundations which, in that monsoon, swept over large areas of the Province and water-logged the soil in some extensive and populous districts, Jullundur and Hoshiárpur especially. But for these exceptional floods the autumnal fever mortality in 1876 would probably not have risen above the normal range for that year in the triennial series.

The fever mortality during the four last months of 1876 exceeded the average fever mortality of the same months in the corresponding years of the preceding triennial periods, namely, 1870 and 1873, by 30,431 deaths in September, 38,256 in October, 31,085 in November, and 25,246 in December. If we deduct these numbers from the actual fever mortality registered in those months respectively of 1876, then the autumnal fever mortality of that year will be represented by the red lines marked on the chart. These red lines restore the regularity in the course of fever mortality in the triennial period, and, whilst serving to illustrate the normal range of autumnal fever mortality for that year, also show the extent of the increased mortality caused by the exceptional circumstances of extensive floods and water-logged soil.

The autumnal fevers decline to a minimum in such triennial period.

59. However, without laying any particular stress on this explanation of the exceptional rise in the autumnal fever mortality of 1876, it is worthy of note that the chart shows a very remarkable and regular tendency of fever mortality in this Province to rise and fall in the limitary years respectively of each triennial period; the mortality in the intermediate year, with equal regularity, holding a medium position between that of the initial and terminal years of each triennial period. This regularity in the decline of autumnal fever mortality to a minimum in each third year is observed to hold good, whether the amount of that mortality in each triennial period be high or low.

The first triennial period, 1869 to 1871.

In the first triennial period of the series shown in the chart, namely, 1869 to 1871—though at that time registration was in its infancy—the maximum range of the first year was largely affected by the famine and high prices of that year, apart altogether from the influences of rainfall. Similarly the high range attained by the maximum autumnal fever mortality in the succeeding year was owing to the continuance of high prices in that year, as will be seen by a glance at the supplementary statement, given on a previous page, of the average annual prices of the principal food grains. But in the third year the decline according to the natural tendency, and favored by cheaper rates of food, was steady and complete, thus bringing the fever mortality, at the end of the triennial period, down to the normal range.

The second, 1872 to 1874.

The second triennial period, 1872 to 1874, shows the normal course of fever mortality through the series of three years, as influenced by rainfall alone—food supplies being at the ordinary rates.

The third, 1875 to 1877.

The third triennial period, 1875 to 1877, shows results which are very instructive, and merit careful attention. The first year of the period shows the normal rise of autumnal fever mortality to the range attained by the corresponding year of the preceding triennial period. But in the second year this mortality, instead of declining to the medium range, in uniformity with the autumnal fever mortality of the corresponding year of the other triennial periods of the whole series, suddenly (as indicated on the chart in black lines) bounded up with enormous strides to the extraordinary height indicated on the chart. The causes of this exceptionally high mortality, as already mentioned, are attributable to the monsoon floods of that year; and the diagram brings out very clearly the enormous loss of life and mischief produced by their effects, notwithstanding that the year was one of prosperity and cheap food. In the third year of this period the fever mortality, in accordance with the natural tendency, and favored by unusually diminished monsoon rainfall and cheap prices of food, fell with equal suddenness and with equally great bounds to the normal ranges of the corresponding year in the preceding triennial periods. The diagram for this year, 1877, illustrates very well the influences of rainfall and food prices upon the fever mortality of the year. As described in my Sanitary Report for 1877, the unusual distribution of the rainfall in that year produced a corresponding unusual distribution of fever mortality in that year. The increased cold weather rainfall produced an increased vernal fever mortality (though nothing approaching to the usual figure of autumnal fever mortality), and the diminished hot weather rainfall a diminished autumnal fever mortality. In fact, in this year there was no epidemic autumnal fever and the year throughout the Province was the healthiest of any for which we have statistical records. And these happy results were the consequence of a dry monsoon season coupled with cheap food.

The fourth, 1878 to 1880.

The fourth and last triennial period of our series, whilst very markedly maintaining the characteristic features of the period in the rise and fall of fever mortality through its successive years, in exact comformity with the course of mortality from this class of diseases in the severally corresponding years of the preceding triennial periods, shows an enormously increased amount of autumnal fever mortality in the two first years of the period.

This increased fever mortality, as in the case of the corresponding years of the first triennial period of our series—1869 to 1871—was due, as has been explained in my Sanitary Reports for 1878 and 1879, to the combined effects of the distress experienced in those years from famine, high prices, and heavy monsoon rains, coupled with progressive improvement in registration.

But the feature in the diagram of this triennial period which, notwithstanding the effects of the operation of the combined causes above alluded to, calls for notice is the persistence in the tendency of fever mortality, as shown in the preceding series of triennial periods, to sink to a minimum in each third year.

In the third year of this last triennial period the decline in fever mortality from the autumnal range of the preceding year, is very marked, and still more so from that of the first year of the triennial period. But it has not fallen to the normal range of the corresponding year in the preceding triennial periods, and this is attributable mainly to the continuance of high prices for food as will be seen by reference to the tabular statement before referred to, on a previous page, as well as to the after-effects of the preceding year's epidemic fever.

Observations on chart B showing distribution of rainfall from 1868 to 1880.

60. Let us now look at Chart B, which shows the distribution of rainfall in the Punjab by quarters for the same series of years, from 1868 to 1880, inclusive. The amounts shown in the diagram represent the aggregate rainfall registered by inches in the 32 districts of the Province in each quarter of each year.

In this chart, as in the fever mortality, Chart A, two prominent features at once attract attention, namely, the course of rainfall in each year of the whole series, and the course of rainfall in each triennial period of the whole series of years.

In each year, it will be observed, the two first quarters show a very much more restricted range in the rainfall than do the two last quarters. But this is not how we must look at the diagram, in order to trace the effects of rainfall upon fever mortality. To do this we must couple the last quarter of the first year in the series, with the first quarter of its successor, because these represent the rainfall which influences the following vernal fever mortality; and the second quarter with the third of each year, because these represent the rainfall which influences the autumnal fever mortality.

The fever mortality how affected by the rainfall in each year of the series.

61. Thus the rise in aggregate rainfall in the first quarter of 1869 is followed by a corresponding rise in the fever mortality of the second quarter; whilst the decline in aggregate rainfall in the second quarter is followed by a decline in the fever mortality of the third quarter. The succeeding rise in aggregate rainfall in the third quarter is followed by a corresponding rise in the fever mortality of the fourth quarter of the year; whilst the decline in the aggregate rainfall in the fourth quarter of the year is followed by the decline in the fever mortality in the first quarter of the succeeding year. And so on through the series of years.

In 1875, it will be observed, the aggregate rainfall in the third quarter rose to an abnormally high amount; but the fever mortality in the succeeding quarter did not rise much above the normal level for that year. This is to be explained by the facts that though the rainfall was abundant it did not produce water-logging of the soil by obstructions to free surface drainage, as was produced in the following year by a much smaller aggregate rainfall with obstructions to free surface drainage (see Sanitary Report for 1876), and to the prosperity of the people with abundant and cheap food-supply.

The exceptional fever mortality in 1876 with a normal rainfall has been explained in a previous passage as attributable to the effects of floods and water-logging of the soil in that year.

The course of the rainfall in 1877 is deserving of special attention in reference to its influence upon the fever mortality of that year. (See Sanitary Report for 1877.) In this year, it will be observed, the greatest range in the aggregate rainfall occurred not, as is the usual course, between the second and third quarters of the year, but between the last quarter of the preceding year and its own first quarter. Now if we turn to Chart A, we find that the course of fever mortality in that year was in exact correspondence with, and direct relation to, this rainfall. In 1877 the greatest range in the fever mortality took place not, as is the usual course, between the third and fourth quarters of that year, but in the second quarter, following the rise in aggregate rainfall in the first quarter. In this year the range in the aggregate rainfall between the second and third quarters was reduced to the lowest degree of which we have any record, the monsoon rains being absent and the aggregate hot weather

STATEMENT SHOWING THE AGGREGATE RAINFALL BY QUARTERS, PRICE CURRENT OF THE CHIEF ARTICLES OF FOOD BY YEARS, AND THE FEVER MORTALITY BY QUARTERS FOR EACH OF THE 32 DISTRICTS OF THE PUNJAB DURING THE YEARS 1877 TO 1880 INCLUSIVE.

Number.	NAMES OF DISTRICTS.	AGGREGATE RAINFALL IN INCHES.																				AVERAGE PRICE CURRENT.												AGGREGATE REGISTERED DEATHS FROM FEVERS.																			
		1ST QUARTER.				2ND QUARTER.				3RD QUARTER.				4TH QUARTER.				TOTAL FOR THE YEAR.				WHEAT.				RICE.				PULSES.				1ST QUARTER.				2ND QUARTER.				3RD QUARTER.				4TH QUARTER.				TOTAL FOR THE YEAR.			
		1877.	1878.	1879.	1880.	1877.	1878.	1879.	1880.	1877.	1878.	1879.	1880.	1877.	1878.	1879.	1880.	1877.	1878.	1879.	1880.	1877.	1878.	1879.	1880.	1877.	1878.	1879.	1880.	1877.	1878.	1879.	1880.	1877.	1878.	1879.	1880.	1877.	1878.	1879.	1880.	1877.	1878.	1879.	1880.	1877.	1878.	1879.	1880.	1877.	1878.	1879.	1880.
1	Delhi	3·7	2·1	0·9	0·3	5·2	2·0	8·2	1·1	1·2	33·0	26·7	24·7	8·1	...	1·2	1·5	18·2	37·1	37·0	27·6	20	14	15	17	9	7	8	9	21	10	14	18	1,717	2.169	4,003	4,954	2,130	3,481	4,350	4,051	1,816	3,801	8,777	2,691	2,702	13,278	18,205	3,881	8,365	22.729	35,335	15,577
2	Gurgaon	4·0	2·4	0·7	2·0	6·6	1·3	1·6	1·3	3·3	24·4	20·4	12·6	5·9	...	1·8	1·0	19·8	28·1	24·5	16·9	20	14	14	17	9	6	7	8	20	10	13	18	1,355	2,658	3,747	5,229	1,621	4,297	4,062	3,165	1,592	8,569	13,437	2,157	2,209	16,252	27,618	2,885	6,777	31,776	48,864	13,436
3	Karnál	6·8	3·8	1·5	1·9	10·3	7·0	3·2	11·1	4·3	14·9	18·2	17·6	5·6	0·9	0·3	1·0	27·0	26·6	23·2	31·6	20	16	15	17	10	7	9	12	18	10	13	17	1,632	1,555	4,283	5,052	1,764	2,515	4,171	4,003	1,540	2,563	6,406	3,415	1,560	9,859	11,187	4,547	6,516	16,492	26,047	17,017
4	Hissar	3·9	1·2	0·4	0·3	7·5	4·3	1·1	2·4	2·9	14·9	9·1	10·3	2·1	0·4	2·0	0·7	16·4	20·8	12·6	13·7	20	13	13	15	11	7	8	9	24	14	15	17	751	1,352	1,680	1,571	835	1,689	2,751	2,073	809	1,901	3,557	1,719	1,079	3,950	5,898	1,719	3,474	8.892	13,886	7,082
5	Rohtak	2·3	1·4	1·7	0·8	5·6	3·9	3·3	1·5	3·0	15·2	15·9	11·4	4·4	...	1·9	0·9	15·3	20·5	22·8	14·6	20	14	14	16	10	6	7	7	22	12	14	21	1,453	1,860	2,765	3,549	1,823	2,239	3,266	2,963	1,688	2,555	7,540	2,226	2,177	8,686	17,005	2,850	7,147	15,340	30,576	11,588
6	Sirsa	2·1	0·6	0·6	0·5	3·6	8·5	1·0	3·7	4·3	13·5	9·6	1·1	3·9	0·9	0·3	0·8	13·9	23·5	11·5	6·1	22	13	12	14	11	7	8	8	23	13	14	17	463	642	901	930	471	797	1,107	844	385	729	1,247	633	611	1,669	1,952	667	1,930	3,837	5,207	3,074
7	Umballa	7·5	6·8	2·5	4·3	3·9	5·4	8·1	9·6	5·9	25·5	12·6	25·8	6·4	1·6	0·7	0·6	23·7	39·3	23·9	40·3	22	17	15	16	13	8	10	11	21	10	14	19	2,680	1,973	5,039	6,071	2,735	2,999	4,080	4,681	2,138	3,295	5,922	4,695	2,029	10,535	10,917	6,622	9,582	18,802	27,958	22,069
8	Ludhiána	6·8	2·5	1·8	4·2	2·9	6·0	5·0	5·9	19·3	23·1	7·2	29·7	8·5	0·1	0·9	0·4	37·5	31·7	14·9	40·2	24	17	15	17	11	7	7	7	19	9	12	15	1,268	1,340	2,743	1,866	1,662	168	2,059	1,977	1,809	3,298	2,995	2,959	2,385	11,740	5,184	3,587	7,124	18,546	12,981	10,389
9	Simla	13·1	6·5	7·5	1·5	25·1	16·3	9·7	19·9	21·6	37·7	58·8	50·9	5·4	0·1	...	4·7	65·2	60·6	76·0	76·8	15	11	9	11	8	5	4	5	12	7	8	10	31	46	57	61	49	66	70	74	45	81	155	87	45	77	110	92	117	270	382	314
10	Jullundur	10·6	3·2	2·1	3·2	3·6	6·1	4·7	9·4	16·3	35·0	14·2	23·5	9·1	...	0·8	1·0	39·6	44·3	21·8	37·1	24	17	14	17	10	7	8	8	18	9	11	15	3,792	2,263	7,396	3,894	3,196	3,642	4,434	2,983	3,167	8,540	3,959	3,436	4,077	34,266	6,741	4,524	14,232	48,711	22,530	14,837
11	Hoshiárpur	9·4	5·4	2·0	4·6	7·3	6·3	10·5	3·5	22·5	36·3	9·8	28·6	8·6	0·1	0·9	1·8	47·8	48·1	23·2	38·5	24	18	14	18	10	9	9	11	17	9	11	15	3,286	2,688	5,023	3,876	2,338	3,436	4,063	3,386	2,942	4,642	5,133	4,820	3,561	14,809	8,472	6,034	13,027	25,575	22,691	18,116
12	Kángra	19·5	12·2	11·7	13·1	19·7	16·0	17·9	10·6	35·7	111·6	130·1	80·6	21·4	1·6	2·8	4·1	96·3	141·4	162·5	108·4	15	13	11	16	13	11	11	14	12	7	9	12	2,059	2,788	2,798	2,812	1,942	2,297	2,887	3,462	2,303	2,549	4,779	4,492	2,682	3,156	4,180	4,671	8,986	10,190	14,644	15,437
13	Amritsar	10·4	4·1	1·0	2·0	6·7	5·3	5·5	3·7	6·8	23·2	10·2	14·6	8·6	...	1·4	2·8	32·5	32·6	18·1	23·1	24	17	13	16	12	9	9	10	19	9	13	13	3,196	2,584	5,758	2,843	2,868	3,396	4,716	2,966	3,082	4,498	4,333	3,616	3,597	13,578	6,037	5,196	12,743	24,056	20,844	14,621
14	Gurdáspur	12·0	5·0	1·8	2·3	4·0	6·3	8·6	2·8	10·2	10·3	11·8	17·4	11·7	...	0·8	0·8	37·9	21·6	23·0	23·3	23	17	12	16	9	7	7	10	16	7	11	15	4,113	3,929	5,947	4,157	3,583	4,048	4,353	3,380	2,845	3,000	3,648	4,494	3,002	7,635	7,751	5,866	13,543	18,612	21,699	17,897
15	Siálkot	9·6	4·1	2·2	1·6	9·2	5·4	7·5	2·3	4·5	20·4	16·6	14·3	9·1	0·3	0·7	1·7	32·4	30·2	27·0	20·1	22	16	14	14	7	6	6	9	17	9	12	15	3,192	3,386	4,047	3,040	3,121	4,007	2,942	2,815	2,805	2,717	2,725	4,174	2,722	6,151	5,207	5,331	11,840	16,261	14,921	15,360
16	Lahore	6·0	2·2	0·9	0·7	2·9	2·2	4·2	3·5	3·5	12·4	10·8	4·4	4·2	0·2	0·5	0·5	16·6	17·0	16·4	9·1	24	16	13	15	14	8	9	9	17	8	10	14	3,541	3,820	4,117	3,361	2,739	3,654	3,872	3,095	2,729	4,396	3,148	3,795	3,840	12,178	5,659	5,330	12,249	23,508	18,796	15,581
17	Gujránwála	8·8	5·0	1·0	1·2	2·3	4·8	5·8	2·7	3·3	17·3	10·0	7·4	9·5	0·8	...	1·3	23·9	27·9	16·8	12·6	23	16	13	15	14	8	9	8	17	10	10	13	2,890	2,057	3,679	2,181	2,373	2,837	2,330	2,217	1,964	2,080	2,153	2,987	2,325	6,154	4,017	3,333	9,552	13,128	12,179	10,718
18	Ferozepore	2·2	0·8	0·4	1·0	4·0	5·2	1·1	4·9	4·6	11·6	8·1	3·3	4·4	0·2	0·6	1·0	15·2	17·8	10·2	10·2	28	18	14	16	11	6	7	7	22	9	12	16	952	1,259	1,983	1,604	925	1,770	1,622	1,625	1,317	4,059	1,584	2,071	2,416	11,205	2,519	2,914	5,610	19,093	7,708	8,214
19	Rawalpindi	12·1	5·8	2·7	2·3	7·8	12·5	5·8	3·9	6·9	14·1	24·2	10·3	13·8	0 8	1·4	1·0	40·6	33·2	34·1	17·5	30	18	13	10	6	6	5	5	13	9	8	10	1,692	2,445	9,345	5,353	2,236	3,824	5,438	3,419	2,212	3,411	8,144	3,937	3,165	9,115	12,365	5,607	9,305	18,795	35,292	18,316
20	Jhelum	15·1	2·5	2·6	1·6	3·8	4·7	7·7	5·9	4·5	18·6	18·5	10·7	12·8	0·7	0·7	0·6	36·2	26·5	29·5	18·8	27	18	13	14	9	7	7	7	17	10	11	15	1,041	1,346	3,478	2,338	1,257	1,876	2,236	1,890	1,307	2,074	2,704	2,304	1,804	5,088	4,440	3,013	5,409	10,384	12,858	9,515
21	Gujrat	10·6	4·5	1·8	1·2	4·9	3·8	7·9	1·2	4·3	20·6	14·5	8·6	11·0	1·2	0·4	0·9	30·8	30·1	24·6	11·9	25	16	13	14	11	8	8	8	15	9	10	13	1,602	1,782	2,553	2,425	1,796	2,811	2,023	2,392	1,813	2,352	2,690	3,187	2,068	4,457	4,695	3,777	7,279	11,402	11,961	11,781
22	Shahpur	5·2	10·0	2·1	1·5	4·2	4·4	0·9	2·4	0·6	14·9	7·6	7·6	5·4	...	...	0·8	15·4	29·3	10·6	12·3	28	17	12	12	5	6	7	7	18	10	10	10	973	1,106	2,256	1,276	1,068	1,247	1,291	1,254	847	1,152	1,142	1,218	1,219	3,220	1,303	1,351	4,107	6,725	5,992	5,099
23	Mooltan	1·4	0·7	1·5	0·3	1·4	1·1	1·7	1·3	9·7	8·1	1·7	2·6	1·1	0·4	...	0·5	13·6	10·3	4·5	4·7	21	13	13	14	8	7	7	8	16	8	10	13	2,665	1,807	2,434	2,315	1,868	1,478	1,455	1,781	1,342	1,491	877	1,359	2,175	3,389	1,834	2,575	8,050	8,165	6,600	8,030
24	Jhang	2·8	1·9	0·9	0·9	6·7	2·3	1·4	1·7	4·9	9·2	1·9	1·9	2·5	...	...	0·2	16·9	13·4	4·2	4·7	24	14	12	13	11	7	8	7	19	9	9	12	886	619	842	923	678	481	452	853	520	424	320	821	742	876	439	992	2,826	2,400	2,053	3,589
25	Montgomery	12·6	0·4	1·4	1·2	2·3	3·4	1·2	6·0	3·8	13·9	2·6	1·5	2·3	...	...	1·2	21·0	17·7	5·2	9·9	28	16	13	14	10	7	7	8	15	8	8	9	1,624	1,199	1,766	1,345	1,164	936	972	1,007	796	913	656	994	1,297	2,762	1,539	1,515	4,881	5,810	4,933	4,861
26	Muzaffargarh	2·0	0·2	1·1	...	1·9	1·7	1·4	0·7	6·5	8·2	...	0·1	1·2	...	0·1	0·5	11·6	10·1	2·6	1·3	21	13	13	14	9	7	6	8	13	6	7	9	1,877	1,217	2,082	1,802	1,248	1,160	1.200	1,319	1,023	1,167	810	1,010	1,557	3,674	1,594	2,090	5,705	7,218	5,686	6,221
27	Dera Ismail Khan	4·1	2·0	1·4	0·1	3·3	5·4	0·2	...	0·4	8·9	3·1	3·1	3·9	...	...	0·8	11·7	16·3	4·7	4·0	28	16	12	10	10	6	6	6	14	9	7	9	1,328	1,457	2,784	2,015	1,343	1,426	1,534	1,463	1,992	1,366	967	1,260	1,346	1,053	1,711	1,733	5,009	8,302	6,996	6,471
28	Dera Ghází Khan	1·9	0·5	1·9	...	0·9	2·2	2·0	2 6	1·4	5·6	0·9	1·3	1·5	...	...	0 3	5·7	8·3	4·8	4·2	21	13	12	13	10	8	7	8	13	8	9	11	1,104	718	1,132	1,354	870	779	662	1,021	592	664	454	826	614	1,819	649	960	3,180	3,980	2,897	4,161
29	Bannu	4·0	3·3	4·0	0·2	7·8	7·6	1·8	1·8	1·8	4·7	5·6	7·6	5·1	...	0·1	0·7	18 7	15·6	11·5	10·3	40	20	12	10	8	7	4	5	14	9	6	8	603	719	2,030	1,170	635	627	1,019	971	1,470	840	695	957	611	235	966	1,663	2,319	4,536	4,710	4,761
30	Peshávar	6·8	3·8	2·7	0·7	6·2	7·2	...	0·8	...	10·8	1·1	1·4	12·5	...	0·5	1·0	25·5	21·8	4·3	3·9	26	17	8	7	10	7	5	5	12	7	6	8	851	1,098	2,142	1,707	1.037	2,363	1,608	1,068	630	1,785	1,183	1,142	860	1,520	2,556	2.535	3,378	6,766	7,489	6,652
31	Hazára	14·3	14·0	6·2	4·8	19·7	13·6	5 2	8·3	9·1	19·4	22·1	18·6	26·2	1·3	2 2	1·4	69·3	48·3	35·7	33·1	25	14	10	10	14	6	7	7	12	7	7	9	1,145	880	1,771	1,238	899	1,589	1,339	1,152	766	1,204	1,423	1,185	830	5,232	1,923	1,584	3,640	8,905	6,456	5,159
32	Kohát	7·1	3·6	2·7	0·5	6·5	4·3	0·8	4·4	2·5	15·9	6·2	5·7	19·0	2·4	0·6	0·7	35·1	26·2	10·3	11·3	32	19	9	8	12	10	6	5	12	8	7	7	203	142	838	454	178	144	285	282	191	202	267	354	160	798	368	664	732	1,286	1,758	1,754

rainfall barely exceeding that of the cold weather. The fever mortality in the following quarter was in exact correspondence reduced to the lowest range, and did not exceed that of the second quarter. In fact in this year the autumnal fever mortality was altogether absent, as were the monsoon rains.

The remarkable and regular triennial periodicity in the rise and fall of aggregate rainfall.

62. So much for the course of rainfall in each year of the series. Let us now notice its course in each triennial period. It will be observed that, as was noticed in the triennial course of fever mortality illustrated on Chart A, there is a very remarkable and very regular triennial periodicity in the rise and fall of aggregate rainfall. The first year of each triennial period shows a maximum rainfall, the third a minimum, and the intermediate year a medium rainfall. And this regularity in the tendency of the rainfall to decline to a minimum amount in every third year is unbroken by any exception, whether the amount be high or low in each triennial period.

This is a noteworthy circumstance, and in remarkable conformity with the course of fever mortality shown on Chart A.

Statements illustrating how far the relation of fever mortality to rainfall and food-supply is maintained in each district of the Province.

63. Such are the results shown by the statistics of the whole Province. I annex, herewith, a tabular statement (separate sheet attached) showing the aggregate rainfall by quarters, average price current of the chief articles of food by years, and the fever mortality by quarters for each of the 32 districts of the Province for the years 1877 to 1880, inclusive, in order to illustrate how far this relation of fever mortality to rainfall and food-supply is maintained in the individual districts.

The highest rate of mortality for the year under report, it will be seen, was registered in the towns and rural circles of the Delhi, Karnál and Rawalpindi districts, the districts in which epidemic fevers were most destructive during the preceding year. A considerable proportion of this mortality is due to the continuance, during the first three or four months, of the preceding year's epidemic.

Fever mortality in the first instance due to rainfall, more especially so to the monsoon rains.

64. In Chart D I have given the fever mortality and aggregate rainfall together, by quarters for the same series of years, in order to show more clearly the relation in which the two stand to each other. The peculiarities of the exceptional years 1876 and 1877 have been already explained, as also the higher mortality from autumnal fevers in the famine years 1869, 1878 and 1879.

It will be observed that the relation between the rainfall of the 3rd quarter and fever mortality of the 4th quarter is very steady and striking, both in the series of individual years and the series of triennial periods. The like relation, though not so strikingly apparent, is equally steady in the other quarters.

The main fact they very clearly illustrate is, that fever mortality in the first instance is due to rainfall, and most especially so to the monsoon rains.

Table proving that scanty monsoon is followed by diminished fever mortality and abundant monsoon by increased fever mortality.

65. Thus, then, we find that a comparison between the annual fever mortality and aggregate rainfall shows that the years in which there was a diminished monsoon rainfall were invariably healthy years, whilst those in which there was an abundant monsoon rainfall were years of more or less severe epidemic fever mortality.

This is illustrated very clearly in the subjoined statement, showing the aggregate rainfall in the months of July, August and September (monsoon season), the aggregate fever mortality in the ensuing months of October, November and December (autumn season), and the number of deaths registered from fever in August and October (to show the sudden rise in fever mortality after the monsoon rains). The table also gives the annual aggregate amount of rainfall and of fever mortality, together with the percentages of rainfall in the third (monsoon) quarter, and of fever mortality in the fourth (autumn) quarter, to total annual rainfall and fever mortality respectively. These returns are for each of the series of years from 1868 to 1880, inclusive.

YEAR.	Aggregate rainfall in inches during July, August and September.	Fever mortality in October, November and December.	Fever mortality in August.	Fever mortality in October.	Total rainfall for the year.	Total fever mortality for the year.	Percentage of rainfall in rainy season to total annual rainfall.	Percentage of fever mortality in Oct., November & December to total annual fever mortality.
1868	316	44,527	11,019	15,035	661	151,337	48	29
1869	598	151,720	15,807	56,623	952	272,946	64	56
1870	532	110,346	15,595	44.221	800	275,093	66	40
1871	441	59,320	16,434	19.166	830	213,548	53	28
1872	714	107,563	17,862	45,019	1,043	264.711	68	46
1873	619	78.830	13,595	32,292	813	219,909	76	36
1874	550	65,746	14,682	23,274	838	190,631	66	35
1875	924	117,006	15,164	48,698	1,141	279,825	81	42
1876	630	181,735	17,475	87,052	901	351,286	70	52
1877	229	61,487	15.769	18,623	931	219,281	25	28
1878	653	233,531	20,599	89,687	976	440.492	67	53
1879	510	187,041	30,905	78,173	752	472,939	68	40
1880	459	100,108	23,668	35,762	698	327,727	66	30

An analysis of this table will show that in this Province while a scanty monsoon is followed by diminished fever mortality, an abundant monsoon is followed by increased fever mortality. That the one is favorable to the general health and the other produces severe epidemics of fever.

It must not, however, be understood that heavy rainfall alone is the cause of high fever mortality. This is influenced, as we have seen, by high prices of food and by accidents of obstructed drainage of the soil. These, however, are exceptional circumstances. There are others of a more constant kind which also exercise a very marked and powerful influence on the fever mortality which follows after abundant monsoon rainfall. These circumstances include, as we shall presently describe, a variety of features in the very defective sanitary condition of our towns and villages.

From a careful study of Charts A, B and C an abundant monsoon rainfall and more or less severe autumnal fever mortality for 1881 can safely be predicted.

66. The Charts A and B (contrasted together in D), and C, show at a glance the relation which fever mortality bears to rainfall and food prices. These charts are very instructive and worthy of careful study. Their indications are so uniform and regular that I can safely predict for the current year 1881 an abundant monsoon rainfall, and a more or less severe autumnal fever mortality.

The other conditions, such as famine and obstructed drainage, which also exercise an influence upon the amount of this mortality,

67. The next fact they illustrate very clearly is the influence exercised upon the amount of this mortality by other conditions whether independent of rainfall or connected with it. Thus, as we have seen, the higher mortality of 1869, 1878 and 1879 was due to the effects of famine, and that of 1875 to floods and obstructed drainage of the soil; whilst the diminished fever mortality of 1877 was due to the absence of the monsoon rains, coupled with prosperity and cheap food.

Charts A and B illustrate normal course of fever mortality as well as of rainfall for the triennial period, 1872 to 1874.

68. The normal course of fever mortality as well as that of rainfall is best illustrated by the diagrams in Charts A and B, respectively, for the triennial period 1872 to 1874. In these years food was cheap and there was no extraordinary occurrence to affect the ordinary relation between rainfall and fever mortality. We may therefore take this triennial period as typical of the ordinary relation between rainfall and fever mortality, and consider the broad facts disclosed by the statistics for this period with reference to cause and effect, with the view to drawing some practical deductions therefrom.

Rainfall affects fever mortality very differently in the spring and autumn seasons.

69. Apart from the marked tendency to decline from a maximum to a minimum autumnal fever mortality in each triennial period, which has been already noticed, the most important fact which now calls for our attention is that rainfall affects fever mortality very differently in the spring and autumn seasons; the range of mortality in the latter being vastly greater than that in the former season. This no doubt is attributable to the fact of the hot weather rains being vastly more abundant than the cold weather rains, but it does not explain why, when, as in 1877, the hot weather rains are transferred to the cold weather, there is no correspondingly excessive vernal fever mortality.

Excessive rainfall in the winter months incapable of producing such high fever mortality as that which occurs after hot weather rains.

70. From the experience of 1877, it appears that an unusually excessive amount of rain in the cold weather months is incapable of producing a vernal fever mortality in anything like the proportions of the autumnal fever mortality after the ordinary hot weather rains, and also that the absence of the hot weather rains is followed by an absence of the autumnal fever mortality.

How are we to explain this?

The explanation of these facts.

71. The conditions of life of the people, the conditions of their sanitary surroundings, during the periods under consideration, present no features of change. It is only the weather in which changes are observed to take place. We have seen, in the case of other years not now under consideration, how changes in the conditions of the life of the people, as in seasons of famine and high prices, or in the conditions of their sanitary surroundings, as in obstructed drainage of the soil, operate to increase the amount of ordinary fever mortality, and most especially so in the usual period of its maximum prevalence, namely, the autumn months. But these are exceptional causes producing exceptional mortality. What we are now concerned to discuss are the ordinary causes in the conditions of the life of the people and of their sanitary surroundings, which operate to favor the influence of weather in the production of fever mortality.

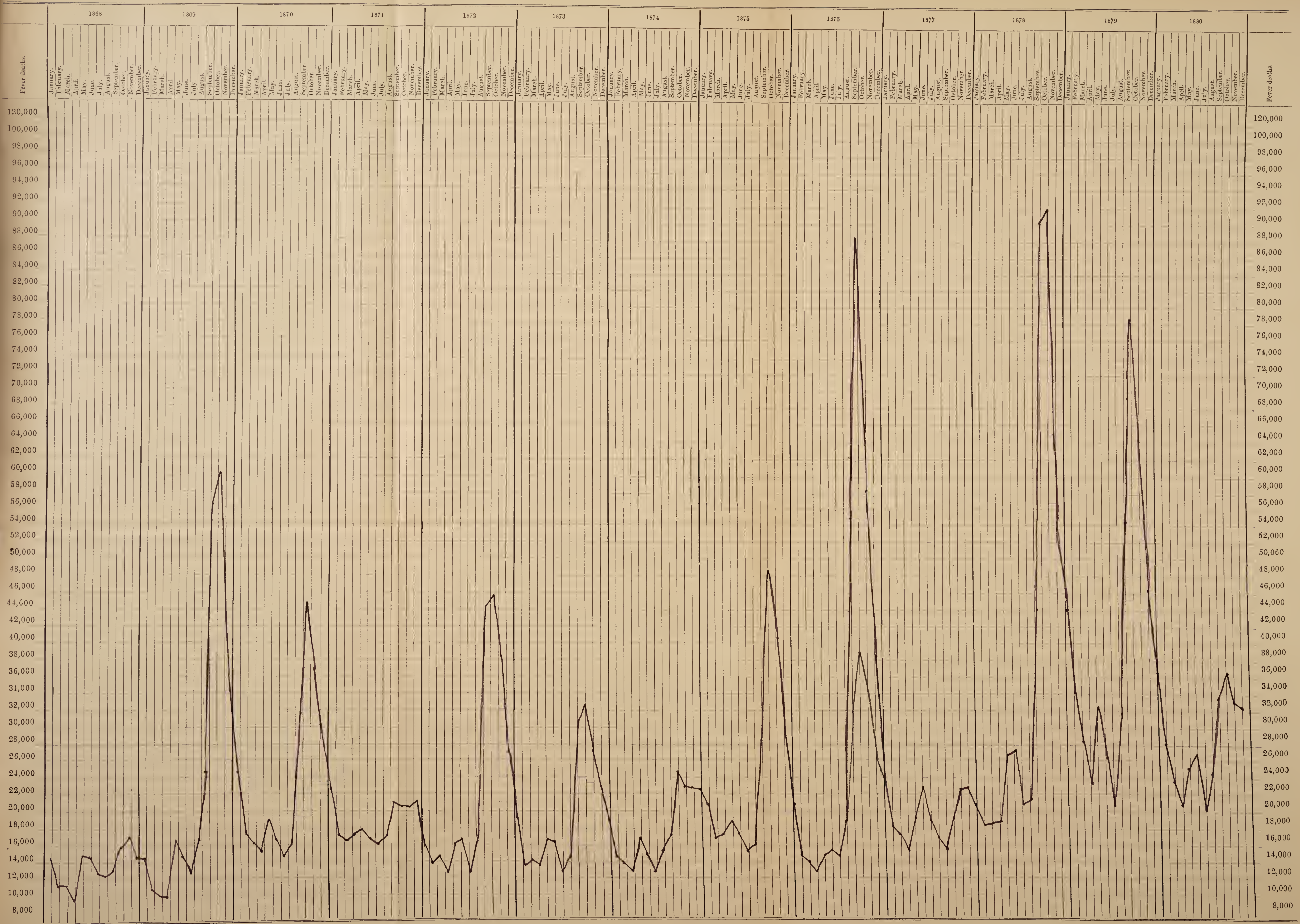
The influence of weather in the production of fever mortality.

72. Before entering on this discussion, it is advisable first to consider what are the influences of weather in the production of fever mortality.

Our statistics prove that the weather, rainfall especially, does exercise a very marked and potent influence on the production of mortality from this class of diseases. In fact that rainfall is the principal factor in the production of fever mortality in ordinary years, and that the activity and force of its operation is very remarkably influenced by the season in which the rainfall occurs.

A.

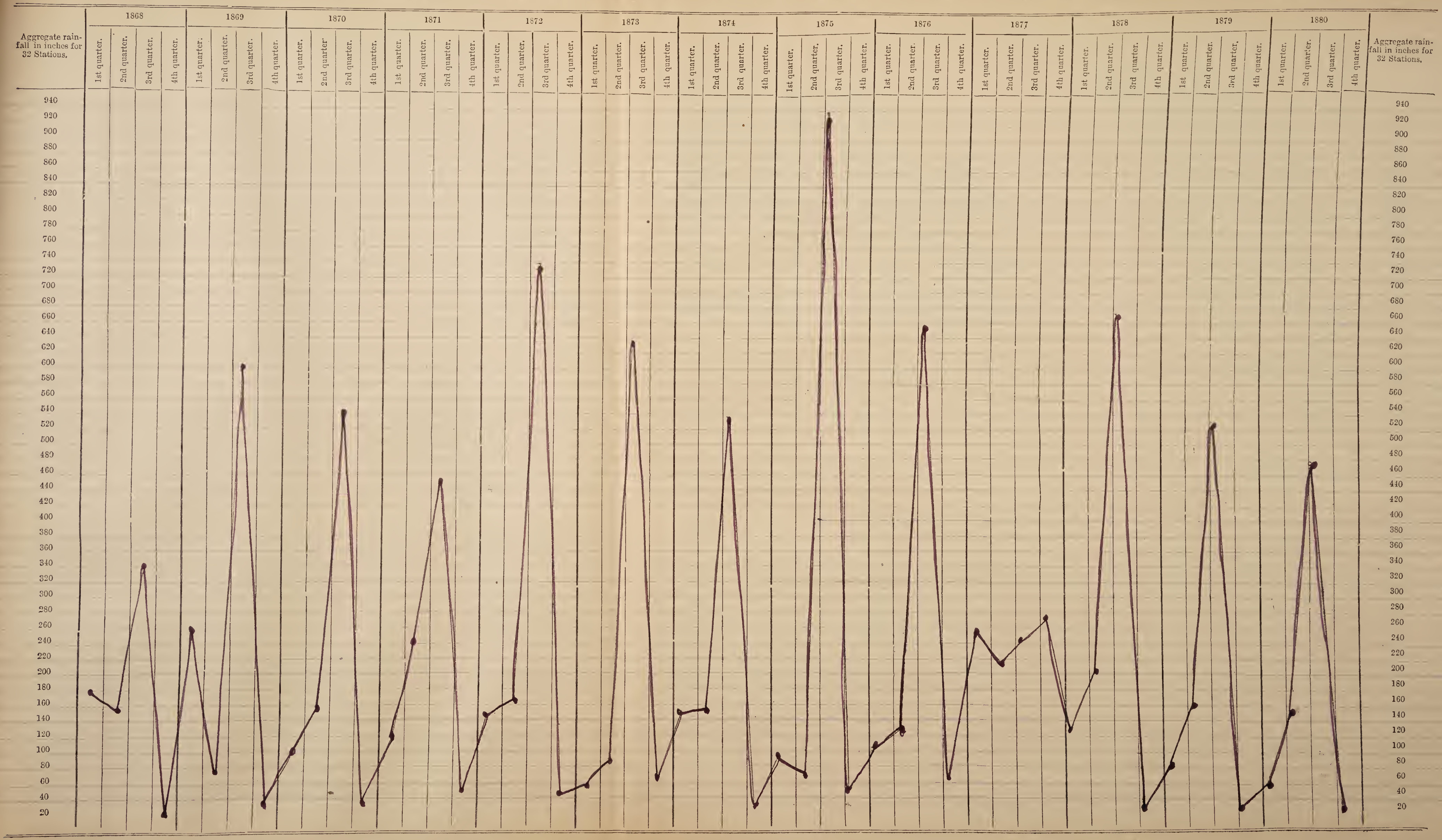
Chart showing the monthly Distribution of deaths from fevers in the Punjab, during the year 1868 to 1880 inclusive.



NOTE.—In 1876, the exceptionally high mortality occurred consequent upon the violent floods and inundations which swept over large areas of the Province especially the Hoshiárpur and Jullundur districts during the rainy season. The normal mortality is represented by the lines marked in black ink.

B.

Chart showing the distribution of rain-fall by quarters in the Punjab during the years 1868 to 1880, inclusive.



C.

Chart showing the rise and fall in the price of principal food grains during the year 1868 to 1880, inclusive.

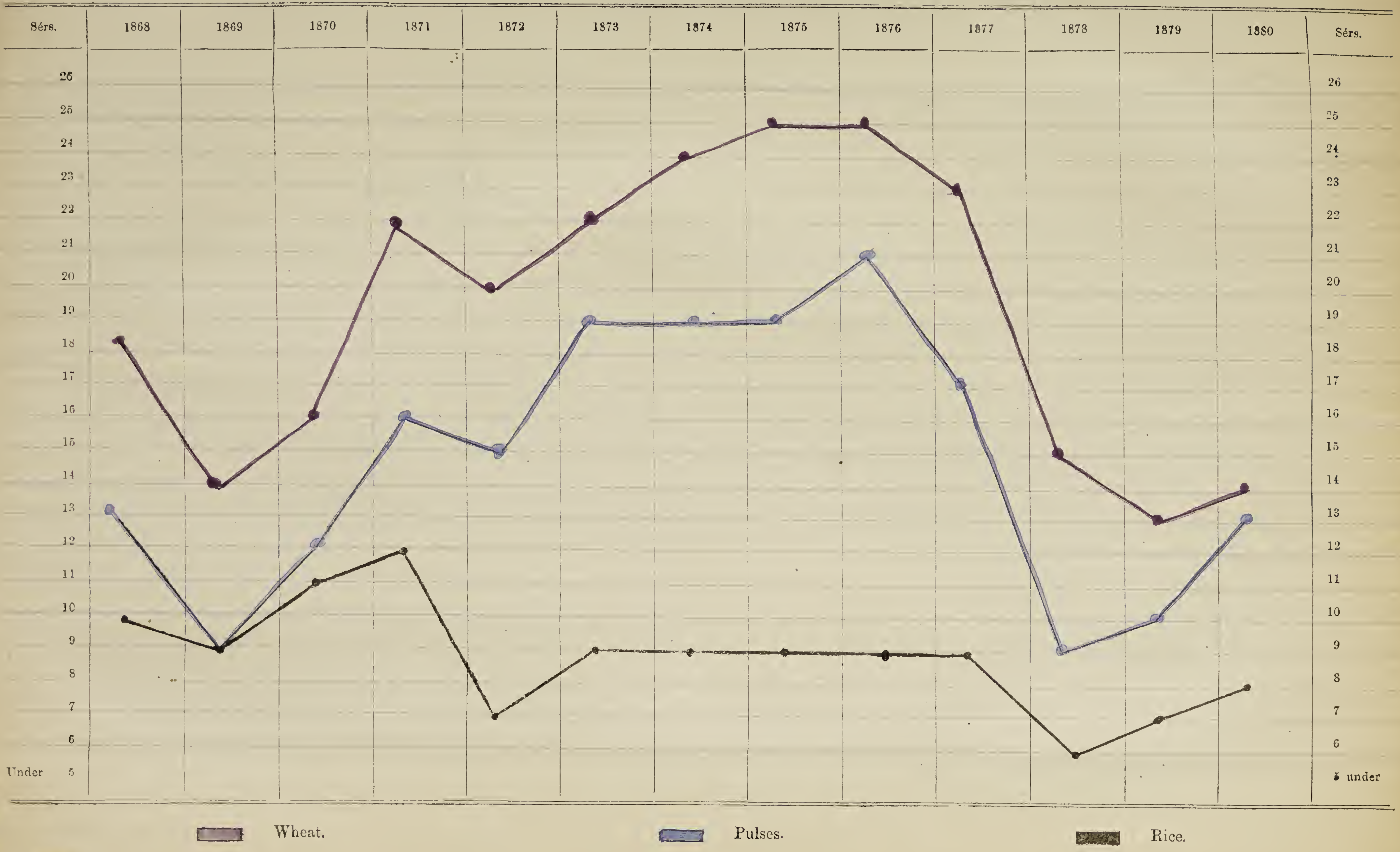
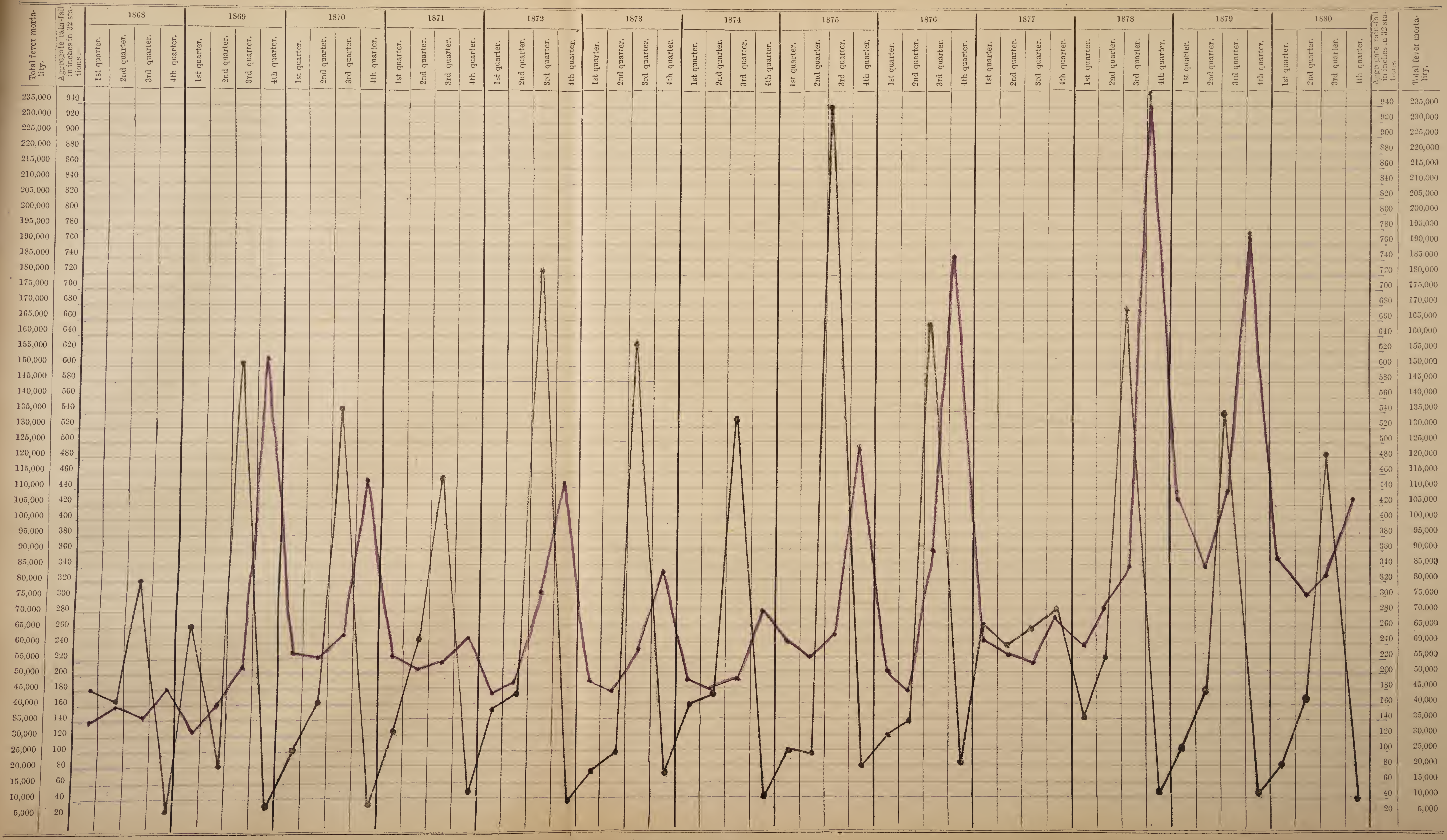


CHART D.

Chart showing the distribution of deaths from fever and aggregate rain-fall in inches in the Province, by quarters, during the years 1868 to 1880, inclusive.



NOTE.—The black line wave denotes aggregate rain-fall.
The red ditto ditto the total fever mortality.

We find that the cold weather rains, even when in unusual quantity, act but weakly in the production of fever mortality. Whereas the hot weather rains act with a force which uniformly produces epidemic fever mortality. How are we to explain this? Certainly the explanation cannot be said to lie in the mere fact that the hot weather rains are vastly more abundant and continuous than those of the cold weather, because we see, from the case of 1877, that when the natural order of rainfall is reversed, the cold weather rains being greatly increased and the hot weather being reduced to an amount less than that of the cold weather, there is no correspondingly proportionate change in the course of fever mortality. Of course the autumnal fever mortality is absent because the hot weather rains are absent, but the excessive cold weather rains are not followed by an excessive vernal fever mortality as they should have been had mere amount of rainfall been the sole factor in the production of fever mortality.

It is then the weather as a whole which controls the action of one of its most prominent elements—rainfall—in the production of fever mortality.

But how this weather acts directly we have no means of accurately describing for want of statistical data; though there is no doubt that the several elements which together constitute the weather, such as magnetism, heat, barometric pressure, humidity, winds, clouds, &c., do exercise a certain direct influence on the production of fever mortality in common with mortality from other causes. The control of these elements is beyond our power, but it is not beyond the power of the individual to protect himself, to some considerable extent at least, from the direct action of some of them. Nor is it beyond the power of the community to protect itself against the indirect action through their effects upon the soil of some of these elements of weather. In the case of fever there seems little doubt that " chill " operates as a most active and common cause in immediately inducing attacks of those forms of fever, commonly styled malarious in this country, which constitute the greatest portion of the fever mortality registered in this Province.

But " chill " alone is not to be saddled with the mortality from the fevers which it produces. There are other causes equally wide spread in their action which aid in the production of fever mortality in ordinary years. And these causes are also due to the effects of the weather, but indirectly through its action upon the soil, especially in respect to the effects upon it of rainfall. We have seen that the weather of the cold season, even with excessive rainfall, fails to produce the fever mortality which follows the weather of the hot season with its accompanying abundant rainfall; and also that the weather of the hot season fails to produce the usual autumnal fever mortality when unaccompanied by its usual abundant rainfall.

Cold weather rains affect only the surface soil whilst the hot weather rains affect the sub-soil also.

73. There is therefore an evident difference in the action upon the soil of the cold weather and the hot weather rains. The difference is dependent upon the quantity of rainfall, and amounts to this. That the cold weather rains affect only the surface soil, whilst the hot weather rains affect the sub-soil also. But there is another difference also, which is of no less importance, and it is this. That the soil during and after the cold weather rains is not affected by solar heat, as it is during and after those of the hot weather. The action of the sun therefore exercises a marked influence upon the effects of rainfall upon the soil. Solar heat is in fact the element which distinguishes the cold weather rainfall from the hot weather rainfall—the vernal fever mortality from the autumnal fever mortality.

Action of solar heat on the soil and its effects.

74. The way in which solar heat acts in this conjunction upon the soil, superficial and deep, to produce fever mortality is very searching and multifarious, and varies, of course, according to conditions of soil and circumstances of locality, but the immediate effect of its action upon the soil may be summed up in the one word " decomposition." Decomposition of the organic matters upon or under its surface. The decay of vegetable life especially which naturally takes place at this season. Heat, moisture, and air, the requisites for the process of decomposition in organic matters, are vastly more abundantly active in the summer and autumn seasons than they are in the winter and spring seasons. It is in the seasons of greatest activity in this decomposition that we have our greatest activity in fever mortality.

Statement showing deaths from fevers among the Jail population, European and Native Army, Police Force, and Urban and Rural population in the Punjab for the past decade.

75. And it seems very clear that the one is intimately connected with the other, as will be seen by reference to the subjoined tabular statement, which shows the average strength, deaths by fevers, and death-rate of different classes of the populations in the Punjab for the decade from 1870 to 1879, together with the means for the whole period.

Statement showing the deaths from fevers in the Jails, European and Native Troops in the cantonments of the Punjab, in the Police Force, and in the Towns and Rural Circles of the Punjab.

		1870	1871	1872	1873	1874	1875	1876	1877	1878	1879	Mean for the 10 years.
Average Strength ..	Jails ...	12,785	13,385	13,512	13,863	14,619	14,347	13,479	12,129	15,230	15,141	13,849
	European Army ...	10,582	11,084	12,178	12,181	11,587	11,888	11,295	11,522	10,524	9,507	11,229
	Native Army ..	15,660	15,234	15,712	15.615	15,405	15,355	15,576	15,709	15,929	12,626	15,282
	Police force ...	17,122	18;300	18,155	18,276	18,932	19,182	19,806	19,610	19,586	19,578	18,855
	Towns ...	2,038,037										2,038,037
	Rural circles ...	15,449,088										15,449,088
Deaths by fevers ..	Jails ...	150	101	107	255	98	108	73	31	368	721	201
	European Army ...	67	52	60	35	31	55	28	27	85	71	51
	Native Army ...	111	37	32	47	34	50	35	28	72	76	52
	Police force ...	31	32	20	32	27	67	29	22	40	46	35
	Towns ...	31,409	24,554	35,072	29,559	24,853	36,563	51,603	28,168	67,304	107,904	43,699
	Rural circles ...	243,684	188,997	229,424	190,350	165,778	243,278	299,683	322,764	561,467	565,309	301,073
Death-rate ...	Jails ...	11·73	7·55	7·92	18·39	6·70	7·53	5·41	2·56	24·26	47·62	13·97
	European Army ...	6·33	4·69	4·95	2·88	2·67	4·63	2·47	2·35	8·07	7·47	4·65
	Native Army ...	7·09	2·43	2·03	3 01	2·21	3·26	2·25	1 78	4 52	6·02	3·46
	Police force ...	1·81	1·75	1·10	1·75	1·43	3·49	1·46	1·12	2·04	2·35	1·83
	Towns ...	15·41	12·48	17·21	14·50	12·19	17·94	25·32	13·82	33·02	52·69	21·46
	Rural circles ...	15·77	12·23	14·85	12·32	10·73	15·75	19 40	20 89	36·34	36·61	19·49

The different classes comprise the Jail population, European army, Native army, Police Force, Urban population, and Rural population. By reference to the last column it will be seen that the mean death-rate for the decade varies very remarkably in these several classes, ranging from less than 2 per mille of strength in the Police Force to upwards of 21 per mille of Urban population and 19 of Rural. The death-rate of the Jail population is nearly 14 per mille, whilst that of the European army is only 4·65 and that of the Native army only 3·46 per mille.

High fever mortality in Jail population explained.

76. The high mortality from fevers in the Jail population is, no doubt, largely due to the depression of spirits under imprisonment, coupled with restricted food and task work, as well as to the defective physique of a considerable proportion of the prisoners.

Excess of fever mortality in European army to what due.

77. The excess of the European army fever mortality over that of the Native army is clearly attributable to the fact of their being strangers to the climate; whilst the excess of the Native army fever mortality over that of the Police Force, recruited from the same classes of the native population, is, perhaps, due to the more domestic life led by the latter.

The high death-rates amongst the Urban and Rural population compared with those in the Native army and Police Force.

78. The high death-rates of the free population in town and country are very striking, but they are not to be compared with the other death-rates merely as they stand, because these classes differ from the others in the very important particular of age. No statistics are kept of fever deaths by ages, and I have therefore been unable to furnish a death-rate for the urban and rural population between the ages of 12 and 60, which is about the range of ages in the other classes. But if we reduce the figures by half, as the fever mortality occurring outside the ages of the above limits, we should still have the Urban fever mortality represented by 10·73 per mille, and the Rural by 9·74. And if we compare these assumed rates with the ascertained rates in the Native army and Police Force, we shall be able to arrive at some idea of the well known excessive mortality from fevers among the urban and rural populations of the same ages as their brethren in those branches of the Government service.

The difference how accountable.

79. How are we to account for this difference? The people are the same; their conditions of life in point of food and clothing present no striking differences; and they are all alike exposed to the influences of the weather. But the points in which they differ are the conditions of their house shelter and their sanitary surroundings.

In the case of the native troops and police, though there are faults of clothing and diet worthy of attention, the men are better housed—in point of ventilation and exclusion of cattle particularly—than their kinsmen dwelling in towns and villages; whilst their sanitary surroundings are of an altogether different kind. They live within areas where conservancy is carefully enforced, drainage attended to, water-supply protected, ventilation provided for, and other sanitary precautions regularly observed. They live in fact in an atmosphere calculated to preserve health. Under such conditions we find that the average fever mortality among the native troops is no more than 3·46 per mille per annum, and among the police only 1·83.

In the case of the urban and rural populations, though there are the same faults of clothing and diet to an even greater extent, the people are worse housed, particularly in respect to defective ventilation, overcrowding, and sharing the shelter of the family roof with their cattle, than their brethren in the native army and police; whilst their sanitary surroundings are of a most faulty kind. They are born, live, and die in areas where conservancy, in villages particularly, is habitually neglected or but carelessly performed, where drainage is unprovided for, water-supply needlessly polluted, ventilation unthought of, and sanitary precautions generally altogether ignored. In fact they live in an atmosphere calculated to produce disease. Under such conditions we find that the average fever mortality among the urban and rural populations of all ages is no less than 21·46 and 19·49, respectively, per mille per annum, of which one-half, or 10·73 and 9·74, respectively, is taken to represent the mortality between the ages of 12 and 60 years to approximate a comparison with the fever death-rate of 3·46 in the native army and 1·83 in the police force. The difference is very striking.

From the observance of the practice of sanitation a small fever death-rate is the result.

80. With the observance of the practice of sanitation we find a small fever death-rate; with the neglect of its practice we find a high fever death-rate by more than treble and quadruple that of the native troops and police of corresponding ages.

But the neglect of sanitation in villages and the dwelling quarters of towns is habitual and constant, whereas the prevalence and activity of fever mortality is only periodic and seasonal. How are we to explain this? I have in a previous paragraph alluded to the difference between the vernal and autumnal fever mortality, and shown that the excess of the latter over the former is owing to the action of solar heat in conjunction with rain upon the soil, and that the nature of that action was decomposition of organic matters in or on the soil. In other words, that decomposition of these matters was not so active and wide spread in the winter and spring as in the summer and autumn.

Sanitation in towns and villages.

81. This being the case, the less of these matters there are about our dwellings in town or village the less will be the amount of decomposition there, and the less will the inhabitants suffer from its evil effects—effects produced by the exhalations given off in the process of this decomposition.

In our cantonments and civil stations, by careful sanitation, the materials for this decomposition are reduced to a minimum, and with the good results shown by our statistics of fever mortality. In our municipal towns much has been done to improve the sanitary condition of their public thoroughfares and surroundings, but the dwelling quarters of the people, where they are born, and live, and die, has hardly yet been touched, and the faulty sanitation, coupled with overcrowding in them, leads to the high fever death-rate shown by our statistics. In our villages, where there is not the same overcrowding, the ventilation is more free, there is an equal, nay an even greater neglect of sanitation, and the result is that notwithstanding the more favorable conditions in point of overcrowding and ventilation, the rate of fever mortality amongst their inhabitants is but little less than that of the town population.

Neglect of conservancy and drainage, the most prominent of the defects in village sanitation.

82. The most prominent of the defects in our village sanitation is the utter neglect of conservancy and drainage. In my sanitary report for 1877 I proposed some simple and easily practicable rules for village conservancy. These were circulated amongst District Officers by Government with orders to use their influence with the villagers to adopt them; but, hitherto, with few exceptions, little has been effected towards this end, owing mainly to the ignorance and apathy of the villagers.

It is for this reason that I have dwelt more at length on the subject of fever mortality in this report and adopted an instructing style, in view to the main facts, where recorded, being explained by District Officers not only to Municipal Committees, but to Local Boards of Health and village headmen.

I have learnt by the experience of my tours of inspection that the apathy of the villagers towards sanitation is owing to their ignorance and the general belief that fever mortality is owing entirely to the influence of weather irrespective of the sanitary condition of their villages, because, as they say, our villages are always in the same dirty condition but our fever sickness comes only after rainfall, and after the monsoon rains in the greatest force.

How the people may be taught to observe simple sanitary rules.

83. Under the circumstances of their knowledge the conclusion is natural enough, but they should be taught that the reason of their greater suffering from fever after the monsoon rains is owing to the poisoning of their breathing air—the atmosphere of their villages—by the unwholesome exhalations which at that season arose from the dung-heaps in every court-yard and the stagnant puddles of filth all round the village outskirts. For this purpose I have given in Section X (Personal Proceedings) in the form of dialogue a description of the method I follow on tour of inspection to correct the false notions of the people on this subject and to instruct them in the more important sanitary matters which require their attention. I would invite the particular notice of District Officers, Medical and Civil, to this part of the report, with the view to their bringing the subject to the notice of Municipal and District Committees and village Lambardárs.

D. BOWEL COMPLAINTS.

The mortality from Bowel Complaints in 1880 and previous years.

Year	Deaths	Year	Deaths
1868	17,823	1875	27,550
1869	30,953	1876	27,271
1870	27,249	1877	17,664
1871	21,678	1878	32,071
1872	23,345	1879	29,612
1873	19,640	1880	20,736
1874	16,407		

84. In the year 1880 there were 20,736 deaths registered in this Province under the head "Bowel Complaints," giving an annual death-rate of 1·18 per mille of population; of this total number 12,760 were males, and 7,976 females.

In the margin I give the total number of deaths registered from Bowel complaints in each year of the series from 1868 to 1880 inclusive.

It will be seen that, as noticed in the case of fever mortality, the mortality from Bowel complaints also shows a regular rise and fall in the maximum and minimum mortality by triennial periods. The number of deaths in the famine years 1869 and 1870 correspond closely to those in the famine years 1878 and 1879 (see Price of Food Statement). At the same time, the whole series of triennial periods, from 1869 to 1871 and onwards, shows a marked regularity in the decline of mortality from this class of disease to a minimum in each third year, in exact correspondence with the triennial decline of the aggregate rainfall.

Statement showing the deaths registered in each month of the year.

85. In the subjoined Statement I give the number of deaths registered from Bowel complaints in each month of the year under report, to show the rise and fall in the mortality from these affections according to the seasons, for comparison with the rainfall shown in Chart B:—

Deaths registered from Bowel Complaints in the year 1880.

Month	Deaths	Month	Deaths
January	1,674	July	1,372
February	1,078	August	2,068
March	997	September	2,925
April	1,120	October	2,873
May	1,548	November	2,040
June	1,363	December	1,678

It will be observed that the minimum mortality occurs in the months of February and March, and the maximum in September and October.

The months in which the mortality from Bowel Complaints rises and falls.

86. An analysis of the returns showing the mortality by months under this head for the twelve years from 1868 to 1879 inclusive, shows that, as a rule, the mortality from this class of diseases sinks to a minimum in the months of February and March, and, with rare exceptions, rises to a maximum in September and October, as in the year under report, the statistics of which form no exception to the above observed course.

Hilly Districts of Kángra and Simla show the highest death-rate from this cause.

87. By reference to Annual Form No. X, it will be seen that the hilly districts of Simla and Kángra had, as usual, the highest death-rate from Bowel complaints, namely, 4·52 and 4·02 respectively, against an average rate of only 1·18 per mille for the whole Province.

I may here state that the periodicity in the rise and fall of mortality from Fevers and Bowel Complaints in relation to a similar course in the rainfall, as above noticed, is also observed to occur in respect to mortality from cholera. But as my cholera section in this year's Report has exceeded the usual limits, I have reserved a detailed notice of this subject for a future opportunity.

Certain classes of death to what causes due and the remedial measures to be adopted.

88. The lesson taught by this reading of our Statistics is, that certain classes of death causes are in the first instance due to the direct influence of weather, and in the next, to the indirect effects of these influences through their operation upon the soil and the surroundings of our daily life. This is the ordinary rule against which our remedial measures must be directed, leaving exceptional occurrences, such as famine, obstructed drainage from floods, &c., to be dealt with by exceptional measures.

And how are the direct influences of weather (which are, as we know, beyond our control, or foresight to some extent), to be combated? The obvious reply is by protecting the body against them, by attention to clothing, shelter, and diet.

And how are the indirect influences of weather (which are, as we know, more or less completely under our control, or forethought to a great extent) to be combated? Experience has abundantly proved the fitting reply to be, by fortifying the body against them by surrounding it with the conditions best suited to its sound health, namely, by efficient conservancy of the air, water and soil; and this is easily attainable by due observance of the ordinary rules of domestic hygiene and Municipal sanitation, whether in town or village.

Without attention to these teachings of our Statistics it is hopeless to look for any material diminution in our mortality list. So long as the people are under-clad, ill-fed, and badly housed, so long will they be victims of the weather. And so long as the people are surrounded in their dwellings with foul air, impure water, and a polluted soil, so long will they be the victims of their own carelessness.

E. INJURIES.

Detail of deaths from Injuries.

89. It will seen by reference to Annual Statement No. VI that the total number of deaths registered in 1880 from Injuries of various kinds was 5,557. In the preceding year the number was 5,783, and in the year before that 5,306.

Of the number for the year under report 286 deaths were caused by Suicide, 3,783 by accidents 346 by wounding, and 1,142 by Snake-bite and killed by wild beasts.

Suicidal deaths.

90. A detail of the Suicidal deaths under specified heads, and according to sexes, is given below for the present and preceding years —

Deaths by	1879		1880	
	Males.	Females.	Males.	Females.
Drowning	29	102	32	56
Hanging	36	51	52	60
Poisoning by Opium	6	6	11	16
Poisoning by Arsenic... ...	6	7	5	3
Cutting throat	1	...	1	2
Stabbing	3	...	...	...
Gunshot wound	3	...	4	...
Falling from heights ...	4	3	4	8
Setting fire to houses ...	1	...	2	...
Causes not stated	32	17	21	9
Total ...	121	186	32	154

Drowning and hanging, the principal modes of committing Suicide.

91. The statement shows that in this Province the principal modes of committing Suicide are by drowning and hanging. As usual, more than half the deaths from the former cause occurred in the Gurgaon District. This fact has been brought to notice year after year and requires special investigation. It is a curious fact also, that the deaths registered in this District from accidental drowning, are higher in number, particularly among females, than in any other of the Province.

This will be clearly seen by reference to the subjoined statement, which shows the number of deaths registered from Suicidal and Accidental drowning in each District of the Punjab for the quinquennial period 1876 to 1880.

Number.	DISTRICTS.	Population, census 1868.	Suicidal drowning.										Accidental drowning.									
			1876		1877		1878		1879		1880		1876		1877		1878		1879		1880	
			M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
1	Delhi	608,850			...	1	2	5	4	10	4	4			32	40	56	83	50	95	40	79
2	Gurgaon	696,646			4	8	15	18	14	57	16	35			64	123	110	205	77	158	72	109
3	Karnál	610,927			..	...	3	4	...	2	1	4			44	43	50	59	34	46	50	44
4	Hissar	484,681			..	...	...	...	...	...	1	...			19	19	30	45	22	27	26	25
5	Rohtak	536,959			.:	4	2	1	4	9	3	4			29	51	48	70	42	83	31	51
6	Sirsa	210,795			...	...	...	...	...	...	...	1			13	9	11	17	7	4	18	13
7	Umballa	1,008,860			...	1	1	1	...	...	...	...			51	42	47	47	52	36	57	35
8	Ludhiána	583,245			..	2	...	1	1	1	1	2			20	19	27	21	30	26	41	22
9	Simla	33,594			...	...	...	...	...	...	...	...			...	...	...	...	...	...	1	...
10	Jullundur	783,020			1	2	...	3	2	5	...	...			42	30	55	36	44	32	46	28
11	Hoshiárpur	938,890			2	2	1	5	2	9	1	1			77	54	103	75	50	46	89	55
12	Kángra	743,758			1	3	1	6	2	4	3	4			54	19	33	34	52	26	34	23
13	Amritsar	832,750			...	...	...	...	...	2	...	...			43	24	92	57	47	32	56	41
14	Gurdáspur	906,126			1	...	...	1	...	...	..	...			39	18	87	51	74	42	55	44
15	Siálkot	994,458			...	...	...	...	...	...	...	...			49	16	55	3.	42	32	60	32
16	Lahore	775,551			...	...	...	1	...	...	...	...			43	19	56	38	58	29	78	30
17	Gujránwála	550,576			...	...	...	...	...	...	...	...			41	15	47	30	25	26	36	30
18	Ferozepore	533,416			...	...	1	2	...	1	1	1			21	10	43	23	16	10	35	18
19	Rawalpindi	699,647			...	...	...	...	...	...	...	...			30	22	88	38	70	33	53	24
20	Jhelum	500,647			...	...	...	...	...	...	...	...			33	17	40	19	38	21	36	24
21	Gujrat	616,347			...	...	...	...	...	...	...	...			29	28	60	36	41	29	31	20
22	Shahpur	368,796			...	...	...	...	...	...	...	...			18	13	28	17	29	13	23	22
23	Mooltan	459,765			...	...	...	...	...	1	...	...			38	17	58	24	66	35	49	30
24	Jhang	348,027			...	...	...	...	...	...	...	...			26	9	25	14	22	7	28	18
25	Montgomery	359,437			...	...	...	...	...	...	...	...			21	9	37	19	35	10	39	12
26	Muzaffargarh	295,547			...	...	...	...	...	...	...	...			22	13	39	28	19	16	38	23
27	Dera Ismail Khan ..	394,864			...	...	...	...	...	...	...	...			29	11	31	18	11	11	40	19
28	Dera Ghàzi Khan ..	309,978			...	...	...	...	...	...	...	...			10	9	12	4	11	6	19	4
29	Bannu	287,547			...	...	...	...	...	..	1	...			8	8	23	7	12	2	8	4
30	Peshàwar	500,443			...	...	...	...	...	...	...	...			18	7	32	10	11	2	32	10
31	Hazàra	367,218			...	...	...	...	...	1	...	...			12	7	42	17	14	2	12	5
32	Kohàt	145,419			...	...	...	...	...	...	...	...			9	1	...	3	5	2	3	2
	TOTAL ..	17,487,125			9	23	26	48	29	102	32	56			984	722	1,465	1,177	1,106	939	1,236	896

The excess of deaths from Suicidal and Accidental drowning in Gurgaon calls for special investigation.

92. The great excess in the number of deaths from both Suicidal and Accidental drowning in Gurgaon over the corresponding numbers in other districts is very striking. There is no information in this office which enables me to offer an explanation to account for it. The subject is one calling for special investigation, and I would beg to suggest that the District Officer's attention be directed to the singular occurrence with the purpose of ascertaining its cause or causes.

Deaths from Accidents.

93. The deaths from accidents during 1880 and the preceding year are shown in the subjoined classified Statement:—

Deaths by	1879		1880	
	Male.	Female.	Male.	Female.
Drowning	1,106	939	1.236	896
Crushed under and falling from roofs, trees, rocks, &c. ...	715	305	724	307
Lightning	14	2	23	8
Burns	214	197	166	186
Kicks from horses, &c. ...	34	14	44	16
Causes not stated	25	7	14	9
Other causes	97	24	127	27
Total	2,205	1,488	2,334	1,449

Deaths from snake-bite.

94. The number of deaths registered from snake-bite is 968, namely, 673 males and 295 females. The deaths under this head in 1879 were 818, and in the year before 752. The Districts of Lahore and Gujránwála again returned the highest number of deaths from snake-bite.

Deaths from Hydrophobia and by wild beasts.

95. From hydrophobia 107 deaths were registered against 69 in the preceding year.

The mortality caused by wild beasts was as follows:—

By jackals 14 deaths, wolves 21, tigers 3—one in the Delhi District and two in that of Dera Ismail Khan,—leopards 2, wild boars 2, bears 4, and a single death (it occurred in the Ludhiána District) from the bite of a cat. There were also 3 deaths registered from the stings of scorpions, and 17 others the causes of which were unknown.

Deaths from all other causes inclusive of chest diseases.

96. The deaths taken under the head of " All other causes " were 109,292 against 89,732 in the preceding year. But in this number 27,850 deaths from various forms of chest disease are also included.

The mortality from chest diseases is shown below by months—

January	3.321	July	1,612
February	3,190	August	1,677
March	2,963	September	1,968
April	1.909	October	2,053
May	2,063	November	2,274
June	1,846	December	2,974

SECTION VII.

VACCINATION.

Proceedings of the Hon'ble the Lieutenant-Governor of the Punjab in the Home Department,—No. 4586, dated 19th December 1881.

READ—

Report on vaccine operations in the Punjab during the year 1880-81, by Surgeon-Major J. BENNETT, Superintendent-General of Vaccination.

Letter No. 1220, dated 22nd September 1881, from Surgeon-Major H. W. BELLEW, C. S. I., Sanitary Commissioner, Punjab.

OBSERVATIONS.—The first four pages of the Report are devoted to a *resumé* of the results of the working of the Vaccination Department since its formation in the year 1864. In the course of the 17 years that have since elapsed, the Provincial establishment has extended its operations over 25 of the 32 districts of the Province, and the aggregate number of vaccinations performed amount to 4,226,078 in the same period. In addition to the operations by the Provincial establishment 1,656,372 vaccinations were performed by Local establishments, making a total of nearly six million persons vaccinated in the 17 years. The record of the mortality in the Province from small-pox does not extend further back than 1865, the year following that in which the special Vaccination Department was formed; but taking the period of 16 years during which small-pox mortality has been recorded, and dividing it into two equal periods, it is observed that in the first 8 years (1865—1872), the aggregate number of deaths from this disease amounted to 270,509, while in the second period, from 1873—1880, the number amounted to 172,774, or nearly 100,000 less. In the first year of the first period the number of deaths recorded from small-pox was 65,595, in the second period the highest number reached in any year was 49,489. In no year of the first period was the number of deaths from this complaint less than 20,000, for four consecutive years of the second period the number was under 14,000, and in the last year of this period it was little over 9,000.

2. The above statistics furnish conclusive evidence of the beneficial working of the Department in diminishing the mortality from small-pox; but, while acknowledging that good work has been done, His Honor the Lieutenant-Governor cannot but notice the fact that 170,000 deaths from this disease have been registered in the course of the last 8 years, and that only two years ago very nearly 50,000 persons were carried off by the complaint, clearly shewing that much still remains to be done, and that the Department, as hitherto constituted, has been unable to prevent the recurrence of years of excessive epidemic. His Honor is of opinion that not only has the establishment been insufficiently strong to extend operations over the whole Province, but that the system on which it was organized was not the best calculated to attain the object in view. To keep a population protected against the spread of small-pox, vaccination must be carried on continuously; but, under the system hitherto adopted, as described in Dr. Bennett's report, the work has been intermittent; the population vaccinated in one year having been left two, three or more years with a staff of vaccinators quite insufficient to keep the people protected. Of the 25 districts in which operations have been carried on during the last 10 years, it is observed that two only have been completely covered twice, or once in every two years; two, four times; six, three times; seven twice; and eight, only once.

3. As remarked above, the work done by the Provincial establishment has undoubtedly been good, so far as it has gone, as it has demonstrated to the people over a large portion of the Province the great value of vaccination, and the report furnishes good evidence that the prejudices of the people against the operation have, in a great measure, been overcome; but His Honor the Lieutenant-Governor thinks the time has come for extending the work of vaccination more generally and continuously over the Province. The Provincial establishment has always been supplemented by locally-employed vaccinators, and it has now been decided that operations shall be carried on

under a uniform system in all districts by localized establishments, residing in, and paid by, the districts in which they are employed, working under the immediate supervision of the Civil Surgeons and their subordinate medical officers, but subject also, as at present, to inspection by the officers of the Sanitary Department: and it is hoped that, under this system, the working of the vaccination establishment will become more a subject of interest to the local authorities, and that district officials of all classes will co-operate in promoting the extension of vaccination among the people.

4. During the year the aggregate number of operations performed by all the establishments is shewn to have been 483,763, being an increase of 102,597 on the number performed in the previous year. In primary vaccinations the rate of success was 94 per cent. (cases in which the result was unknown being returned as successful). In re-vaccinations, *i. e.*, in cases in which the individuals operated on had been previously successfully vaccinated, or had had small-pox, the rate of success was 53 per cent. The total number of vaccinators and Native Superintendents employed was 287, of which 171 belonged to the Provincial establishment, and 116 were local vaccinators attached to despensaries.

5. The total cost of vaccination in the Province for the year amounted to Rs. 63,313, against Rs. 56,332 in the previous year, or an increase of Rs. 6,980. The cause of this increase is not explained, but is apparently chiefly due to the appointment of the second Deputy Sanitary Commissioner, which had been in abeyance in the previous year, having been occupied by Surgeon-Major Massy during the last 5 months of 1880-81. Operations were for the first time systematically undertaken in the Muzaffargarh district, which the Lieutenant-Governor is glad to observe were, owing to the good arrangements made by the Deputy Commissioner and the assistance rendered by the district officials, attended with great success.

6. The work performed by vaccinators attached to dispensaries appears from the Report to have been better than in former years, but there still appears to be great fault in the manner of working, as in many districts the vaccinators are employed temporarily for the cold season only. It is impossible to obtain the services of efficient men on these terms, and the work done by them is probably very imperfect, and if so, worse than useless, inasmuch as it must tend to strengthen the prejudices of the people against vaccination. Again, in many of the large municipal towns, though the number of vaccinations shewn in the returns is considerable, the work appears to have been done in a desultory manner, and with little or no supervision by the Civil Surgeons or Members of the Municipal Committee. Dr. Bennett remarks unfavourably in this respect on the work done in the towns of Delhi and Amritsar. Large numbers of operations are also returned from several of the frontier districts, but as there appears to have been little or no supervision of the work by the Civil Surgeons, little or no confidence can be placed in the accuracy of the return, or the quality of the work done. In several towns, on the other hand, the work was carefully watched by the Civil Surgeon and his subordinate officers, and an interest in the work shewn by the district officials and influential Members of the Committees. His Honor specially notices that in the towns of Umballa, Ludhiana and Mooltan good work was ensured by these means, and that favourable report is made of the work done in the Jhang district, and of the improvement when compared with the work in the same district in former years, and which appears to be mainly due to the good influence over the people exercised by the Civil Surgeon, Chitan Shah, Rai Bahadur.

7. Good progress was made in the Native States of Bahawalpur, Patiala and Kapurthala. The returns shew the large number of 30,947 operations performed in the Patiala State, but the Medical Officer was unable to vouch for the quality of the work done, or the trustworthiness of the returns. In Kapurthala the progress has been steady for some years past.

8. The Lieutenant-Governor notices with satisfaction the assistance to the cause of vaccination rendered by their Highnesses the Rajas of Mandi and Bilaspur; Hardial Singh, Superintendent of Suket; Rashk Bihari Lal,

Ilahi Bakhsh, Muhammad Ikram, Tahsildars of Raya, Zafarwal and Pasrur, in the Sialkot district; Dalip Singh, Gopal Das and Lachmi Sahai, Tahsildars of Kulu, Dera and Hamirpur, in the Kangra district; Kanhya Lal, Tahsildar of Tarn Taran, in Amritsar district; Murád Ali, Tahsildar of Chiniot, in Jhang; Baij Nath, Tahsildar of Muzaffargarh; and Dwarka Nath, Tahsildar of Hansi, in Hissar.

ORDER.—Ordered that the above be printed and circulated with the Report.

Also that a copy be forwarded to the Sanitary Commissioner, Punjab.

By order of the Hon'ble the Lieutenant-Governor,

W. M. YOUNG,

Secretary to Government, Punjab.

Printed at the Punjab Government Civil Secretariat Press, Lahore.—23-12-81.—218.

No. 1220, dated Lahore, 22nd September 1881.

From—Deputy Surgeon-General H. W. Bellew, C. S. I., Sanitary Commissioner, Punjab,

To—The Secretary to Government, Punjab.

I have the honor to submit herewith the Vaccine Report of the Punjab for the official year 1880-81, drawn up by Surgeon-Major Bennett, Superintendent-General of Vaccination.

2. The re-organization of the Vaccine Department on its amalgamation with the Sanitary Commissioner's office (Government of India Resolution No. 150, dated 15th March 1880) not having been completed before the commencement of the season's work reffered to in this report, with the sanction of His Honor the Lieutenant-Governor, the office of Superintendent-General of Vaccination continued to be held by Dr. Bennett, and the provincial and dispansary vaccine establishments were consequently controlled and supervised by that officer during the year.

3. The first four pages of the report are occupied by a clear description of the manner in which the department has been worked since its first establishment in 1864, and show the average annual strength of the vaccinating staff, the area overtaken, and the vaccination performed year by year. From the statement given on pages 2 and 3, showing the number of vaccinations and the total of persons vaccinated, as also the results of primary vaccination, it is apparent that the efforts of the provincial establishments under the direct control of the Superintendent-General were far more successful than those made by the dispensary vaccinators. For instance, during the decade ending 1879-80 for which the strength of the several classes of establishment is shown in the statement No. I, page 2 of the vaccination report, there was an average annual strength of 142 and 146 vaccinators on the rolls of the dispensary and special departments respectively. But while the staff in both cases was almost equal in numbers the outturn of their work differed very greatly; the total number of vaccinations performed by the latter, or "provincial establishment" during the period referred to being no less than 3,002,000, while that by the former or "dispensary establishment" was only 1,068,696, or in a proportion of 752 persons vaccinated annually by the dispensary against 2,056 by the provincial vaccinator. In point of quality also there was a marked difference in the work done by the two establishments, as will be seen by reference to the statement; the average percentage of success "excluding unknown from the total" being 81·10 for the dispensary establishments during the years 1864 to 1879-80 inclusive.

4. During the year under review, the provincial establishment consisted of 138 vaccinators and 33 native superintendents under the direct control of the Superintendent-General of Vaccination assisted by one European superintendent and one Native deputy superintendent. In the previous year the post of European superintendent had remained vacant, and the working staff consisted of 132 vaccinators and 32 native superintendents. The total cost of the entire establishments during the year was Rs. 63,313, or Rs. 6,981 more than the amount expended in the preceding year. The average cost of each successful case of vaccination was annas 2 pies 3·07 against annas 2 pies 6·62 in the preceding year. Compared with the North-Western Provinces and Oudh the vaccination is done very cheaply in the Punjab, the average cost of each successful case in those Provinces being annas 3 pies 2 during the year 1880-81.

5. The results of the working of the different establishments of the Punjab Vaccine Department are shown in the statements given in paragraphs 7 and 20 of the report, and are very satisfactory as compared with the results obtained during the previous year. This, in the opinion of the Superintendent-General of Vaccination, is due to the "causes which were said to have brought about the large decrease of vaccination in 1879-80, and which were shown in the report for that year to have been of an exceptional nature, having to a great extent

been in abeyance during the year under review." The year, indeed, unlike its predecessor, was a healthy one, and the office of Superintendent of Vaccination which remained vacant during the preceding year was resumed by Dr. Massy. The total number of vaccine operations performed during the year 1880-81 was 483,763. This shows an increase of no less than 102,597 vaccinations over the numbers of the preceding year. Of the total operations 16,883 were re-vaccinations, being 5,209 more than the number done in the previous year. The amount of work done by the two different establishments during 1879-80 and 1880-81 is shown below :—

	Provincial Establishment.	*Dispensary Establishment.*
1879-80	311,123	70,043
1880-81	394,376	89,387

showing respectively an increase of 83,253 and 19,344 during the year under report.

6. With regard to the percentage of success in the primary vaccinations (the "unknown" being included with the total of "unsuccessful") the ratios for the two establishment are as follows :—

	Provincial Establishment.	*Dispensary Establishment.*
1879-80	95·46	88·45
1880-81	95·35	89·38

As to the genuineness of the percentages shown under the head of provincial establishment, Dr. Bennett states in his report that of the 12,611 cases inspected by him he noted only 97 failures.

7. In reviewing the dispensary vaccination the Superintendent-General makes the following remarks :—" In recent years, however, a considerable decrease in the outturn of work accomplished by the different local agencies has taken place. In the last three years, including the year under review, the average annual number vaccinated has been 83,274, while the average of the five preceding years reached 130,508, a difference of 47,234." This he attributes " to the cutting down to a great extent the number of temporary vaccinators employed " and to the pursuit of " the useless, effete system of vaccinating with crusts," instead of with fresh lymph from the arm—a practice which he very properly observes will, "it is to be hoped shortly be abandoned altogether."

8. In paragraph 8 of his report, Dr. Bennett deals with the sex and age of the persons vaccinated. It is satisfactory to note that a considerable increase has occurred in the operations performed on infants under one year of age, the infantile vaccinations being 73,641 more than in the previous year, and 47,710 more than the highest number recorded since the department come into existence. The proportion of vaccinations between the sexes differs but slightly from year to year.

9. As regards the area over which the operations of the vaccinator staff of the provincial establishment extended during the year under report, it is stated that 9 districts were wholly overtaken and 15 partially during the cold weather. In the hot weather the operations were confined to the Murree hills, the Kangra district, part of the Hazara district, the Simla sanitarium, and 16 Native States. Paragraphs 9 to 19 inclusive give the total number of persons vaccinated in the several tahsil subdivisions of the 9 districts wholly gone through, together with the ratios of successful cases per mille of population, as well as the Superintendent-General's remarks on these figures, and also on the outturn of work in the other districts visited. Pages 12 to 18 contain the Superintendent-General's remarks on the amount and quality of the work done in each of the districts in which local vaccinating staff establishments were maintained and supposed to be under the direct control of the civil medical officers. On looking over this part of the report and analysing the statistical tables given in the appendix, I find that the labors of the Vaccine Department did not meet with a unifrom

amount of success in the different parts of the province visited by its several members, a result which Dr. Bennett observes " mainly depends on the fact that very few districts are alike as regards the attitude of the people towards the operation," and I may add also on the fact that a very unequal amount of attention is paid to vaccination by the district civil and medical officers.

10. It will be seen by reference to the tabular statement A., showing particulars of vaccination in the Punjab during 1880-81, that the average number of operations performed by each vaccinator taking the entire area covered by the provincial staff was 2618·78. This standard applied to the results of the individual efforts of the several batches of the local staffs belonging to the provincial establishment will show how great is the difference above alluded to. As illustration, I may here cite the districts of Lahore in which the number of vaccinations performed by each vaccinator amounted to 4,394, Hissar 3,761, Jullundur 3,685, Gujrat 3,582, in comparison with the districts of Simla in which the number was as low as 62, and Sirsa only 38. That is to say while the four vaccinators employed throughout the season in the Sirsa district could only vaccinate 154 presons between them, the same number of vaccinators during the same period working in the Lahore district performed altogether 17,577 vaccinations. Differences of this sort are seen to obtain more or less in the work carried on in the Native States and the dispensaries also, and indicate the very serious defects of the present system.

11. In His Honor's review of last year's report, the Lieutenant-Governor was pleased to observe that " wherever failures have attended the vaccination staff in its visits to the districts to which they have been told off, it has been ascribed either to the obstruction offered by, or to the apathy of, the local authorities; and in like manner when favorable results have been obtained it has generally been the aid or co-operation of the district anthorities. The vaccine establishments have not contained within themselves the elements which would ensure success ; they have depended for that succees almost entirely on the assistance which the local officials have offered." In the scheme for the re-organization of the Vaccine Department, which is now under consideration of the Government, the work of vaccination has been provided for over the whole province through local agency by districts, an arrangement which will require for its success very real and sustained assistance on the part of the local officials.

12. In this connection I would refer to the very favorable results which have attended the exertions of Colonel Jenkins in Kangra, of Mr. O'Brien in Muzaffargarh, and of Assistant Surgeon Chetan Shah, Rai Bahadur, in Jhang, in promoting the cause of vaccination in their respective districts. What is done in Kangra, Muzaffargarh and Jhang and other districts also in which owing to the influence brought to bear upon their inhabitants by the local authorities, the spirit of opposition formerly displayed against vaccination has gradually disappeared, can surely be done in those districts in which the people are still opposed to the measure. The example set by the officers abovementioned as well as by the others whose services are brought to the notice of Government in this report, it is to be hoped will be followed by all district officers, both civil and medical, and by all municipal commissioners.

13. In conclusion, I would invite attention to the want of interest shown by the municipal commissioners of Delhi and Amritsar as reported by Dr. Bennett, an apathy on their part which has been the subject of unfavorable comment in previous year's report also.

Printed at the Punjab Government Civil Secretariat Press, Lahore.—3-1-81.—200.

Report on Vaccine Operations in the Punjab for the year ending 31st March 1881.

From

SURGEON-MAJOR JOHN BENNETT, M.D.,
Depy. Sany. Commr., and Supdt. Vaccination, Eastern Circle, Punjab,

To

SURGEON-MAJOR H. W. BELLEW, C.S.I.,
Sanitary Commissioner, and Superintendent General Vaccination, Punjab.

SIR,

I have the honor to submit my report on Vaccine operations in the Punjab for the year 1880-81.

2. The Office of Superintendent General of Vaccination was amalgamated with that of the Sanitary Commissioner on the 1st April 1880, but as no changes in the working of the Vaccine Department were made, I have, in accordance with the orders of Government, continued to superintend operations throughout the Province as heretofore.

3. As this may be the last report on vaccination which will be submitted under the present system of conducting operations, I think that, before entering into the details of the results obtained during the year just closed, it may not be out of place to give a short account of the organization and working of the Vaccination Department since the formation of the special establishment in 1864. Until the cold season of that year, there having been no special Vaccine Department for the Province, systematic vaccination on an extensive scale had never been attempted. In the Hill States, which, before the days of vaccination, are said to have been hotbeds of inoculation and small-pox, a permanent staff of vaccinators on a small scale, working under the supervision of Dr. Garden, the then Superintendent of Vaccination, Hill States, had for several years been kept up; but in the plains the only work done had been effected by local agency under the superintendence of the Civil Surgeons. In October 1864 a special establishment for the Province, organized on the lines of the Hill establishment, though on a much larger scale, was sanctioned, while the old system of vaccinators working under Civil Surgeons was maintained in districts to which the operations of the Special Department could not reach. At the same time Civil and Medical Officers were requested by Government to actively co-operate with the Superintendent General of Vaccination, and to use their influence with Honorary Magistrates and Municipal Committees to take an interest in the work, and induce the people to resort to vaccination. These measures were considered necessary on account of the great mortality from small-pox throughout the Province. On this point the Secretary to Government, Punjab, in a letter to the Superintendent General of Vaccination, No. 854, dated 13th April 1865, writes: " The necessity for the adoption of some special measures for checking the ravages of small-pox in the plains, is but too evident from the terrible mortality by that disease during the last year in the cities of Lahore and Amritsar (Amritsar 2,701 children, 12 adults; Lahore 1,205 children), and from the following statistics furnished in your report:—

'In the Central Jail at Lahore, out of 1,930 prisoners present in December, only 112 had not evident marks of small-pox, and 10 only allowed they had not had the disease. In the Amritsar Jail, out of 548 prisoners, but 11 had not had small-pox.' "

The strength of the sanctioned establishment amounted to 183 members, comprising 33 Native Superintendents and 150 vaccinators; but as great difficulty in obtaining suitable recruits was at first experienced, the work was started with a staff of only 15 Native Superintendents and 34 vaccinators; and from this small beginning the establishment was year by year made larger as men of respectability and good conduct presented themselves for service. Dr. Garden in his report for 1864 writes: " Many had excellent certificates as to their capabilities, but a few questions exposed their ignorance. Several of these had formerly been employed as vaccinators at dispensaries, and were said to be thoroughly qualified, but, without exception, not one knew his work; they were, indeed, able to vaccinate with dry lymph, and vaccine scabs or 'crusts,' but none knew how to vaccinate from arm to arm. Again, many men were entertained who learnt their work quickly, and promised to become useful vaccinators; but, when directed to visit parts of the country at a distance from their homes, refused to do so, and left the Department."

The duties of the new establishment were chiefly confined to the rural circles, and the towns which were not within convenient reach of the Civil Surgeons, the system of working adopted being similar to that carried out by the Hill establishment: a particular district having been fixed upon as the scene of operations, intimation was sent to the Deputy Commissioner who was asked to direct the Tahsíldárs to divide the tahsíls into a certain number of Vaccine circles, as many circles as there were Native Superintendents to be employed, to each of whom a circle was allotted. At the same time the Tahsîldárs were instructed to provide the vaccinators with lists of villages in the different circles, and to use their best influence with the Zaildárs, Lambardárs, &c., with regard to assisting the vaccinators and prevailing on the people to bring their children forward for vaccination. The ground having thus, in a manner, been prepared, vaccinators were sent on ahead to establish vaccinia in conveniently situated villages with lymph stored in glasses; thus fixing vaccine stations, from which operations could be extended by the arm-to-arm method, to the surrounding villages, and throughout the district generally by the main body of the vaccinators coming on from behind. These again were usually followed up by the European Superintendent, under whose immediate supervision the work was carried out. Passing on in like manner to the other tahsîls, taking them in due order, the vaccination of the district was accomplished; the completeness with which it was effected depending, in great measure, on the disposition of the people towards the operation, favorable or otherwise, and to the amount of assistance received from the local authorities. As many districts in the plains as could be done in the time were in this way overtaken during the cold season, at the close of which, operations were transferred to the British Districts, and Native States in the hills. In the following cold season, in the plains, fresh ground, or ground which had not been systematically gone over for two or three years, was entered on, while a small staff, consisting of a Native Superintendent and four vaccinators, was placed in each of the districts previously vaccinated, to continue the work and to maintain, as much as possible, the degree of protection from small-pox conferred by the operations in the first instance. The plan of operations here described is still in force, although operations have, year by year, been carried out on a larger scale as the strength of the establishment was increased and the men got better acquainted with their duties.

In the following table is shown the outturn of work accomplished by the Punjab Vaccine Establishments, Provincial and Dispensary, together with the number of deaths referred to small-pox in each year from 1864 to 1879-80 both included:—

Statement No. I.

Year.	ESTABLISHMENTS.	Number of vaccinators.	Total number of persons vaccinated.	PRIMARY VACCINATION.			Deaths from small-pox.
				Total.	Successful.	Percentage of success excluding unknown from the total.	
1864	Punjab Vaccine Establishment ...	49	50,399	50,067	46,586	93·0	...
	Dispensary and Local Establishments	...	101,885	101,885	76,761	75·3	
1865	Punjab Vaccine Establishment ...	79	133,045	131,883	123,536	92·8	65,595
	Dispensary and Local Establishments	...	97,562	97,251	72,864	75·7	
1866	Punjab Vaccine Establishment ...	100	162,100	159,764	151,244	94·74	30,615
	Dispensary and Local Establishments	...	85,994	84,750	61,735	74·00	
1867	Punjab Vaccine Establishment ...	104	134,820	133,600	126,402	95·01	20,483
	Dispensary and Local Establishments	...	61,746	59,606	42,345	72·3	
1868	Punjab Vaccine Establishment ...	107	168,970	168,175	159,704	95·94	24,222
	Dispensary and Local Establishments	...	64,892	61,996	44,177	72·96	
1869	Punjab Vaccine Establishment ...	111	180,368	178,795	169,537	96·04	53,169
	Dispensary and Local Establishments	78	96,828	91,009	64,777	72·60	
1870-71	Punjab Vaccine Establishment ...	120	141,224	138,325	131,228	97·10	27,163
	Dispensary and Local Establishments	82	80,225	77,165	58,579	80·12	
1871-72	Punjab Vaccine Establishment ...	139	196,435	193,137	183,050	98·03	25,534
	Dispensary and Local Establishments	127	85,084	80,288	61,101	82·86	
1872-73	Punjab Vaccine Establishment ...	139	281,776	278,953	264,957	98·19	23,728
	Dispensary and Local Establishments	101	90,409	86,771	62,861	78·64	
1873-74	Punjab Vaccine Establishment ...	147	343,322	340,228	323,392	98·45	25,699
	Dispensary and Local Establishments	167	130,613	126,677	98,381	84·76	
1874-75	Punjab Vaccine Establishment ...	145	374,615	371,934	355,180	98·60	12,026
	Dispensary and Local Establishments	201	136,810	134,340	103,660	85·62	

Statement No. 1.—concluded.

Year.	Establishments.	Number of vaccinators.	Total number of persons vaccinated.	Primary vaccination.			Deaths from small-pox.
				Total.	Successful.	Percentage of success excluding unknown from the total.	
1875-76	Punjab Vaccine Establishment ...	144	299,872	295,929	280,949	98·43	13,594
	Dispensary and Local Establishments	202	135,699	131,398	107,103	87·86	
1876-77	Punjab Vaccine Establishment ...	149	288,527	284,771	270,434	98·67	10,254
	Dispensary and Local Establishments	162	127,556	123,326	Not known		
1877-78	Punjab Vaccine Establishment ...	150	373,577	371,821	356,589	98·81	12,296
	Dispensary and Local Establishments	152	121,864	115,535	96,066	88·27	
1878-79	Punjab Vaccine Establishment ...	168	391,529	380,118	359,893	98·08	40,271
	Dispensary and Local Establishments	103	90,393	85,301	75,756	92·76	
1879-80	Punjab Vaccine Establishment ...	164	311,123	301,835	288,141	98·53	49,489
	Dispensary and Local Establishments	124	70,043	67,657	59,846	92·78	
	TOTAL ...	126	3,831,702	3,779,335	3,590,822	96·90	434,138
		136	1,577,603	1,524,955	Incomplete	81·10	

NOTE.—The number of deaths attributed to small-pox in 1880 throughout the Province declined to 9,145, the lowest on record.

In a resumé of the work done by the establishment during the first six years of its existence, given in the Vaccination Report for 1870-71, it is noted that the districts of Lahore, Amritsar, Hoshiárpur, Jullundur (vaccinated twice), Ludhiána, Umballa, Karnál, Delhi, Rawalpindi, Siálkot, Gujránwála and Gurdáspur had been vaccinated, being an average of somewhat more than two districts a season; while, as before mentioned, a small local staff had been left in each of the districts previously gone over by the main body of the vaccinators to continue the work. In the corresponding hot seasons, operations were carried through the district of Kángra, including the outlying sub-divisions of Kulu, Lahoul and Spiti, the district of Simla, the hills of Murree and Kahuta, and the principal Native States in the hills.

To continue the summary :—

During the cold weather of 1870-71 the districts of Lahore and Ludhiána were completely covered, while considerable portions of the districts of Umballa, Delhi, Karnál, Jullundur, Hoshiárpur, Amritsar, Siálkot, Gurdáspur, Gujránwála and Rawalpindi were also overtaken; in the hot season the British Hill Districts and seven Native States were visited. Strength of establishment 120, an increase of 9 over that of previous year; and total number vaccinated 141,224, a decrease of 39,144 from previous year.

In the cold season of 1871-72 the districts of Umballa, Amritsar and Rawalpindi were gone over; and operations were carried on by the smaller local staffs in the rural circles of Lahore, Delhi, Karnál, Ludhiána, Jullundur, Hoshiárpur, Gurdáspur, Gujránwála, Siálkot and Rawalpindi. In the corresponding hot season, the districts of Kángra and Hazára and eleven Native States were visited. This year the strength of the establishment was increased by 19, while the total number of operations exceeded that of previous year by 55,211.

In the cold weather of 1872-73 the itinerating portion of the establishment worked in the districts of Hoshiárpur, Kángra, Rawalpindi, Jhelum, Gujrat, and the plain portion of the Patiála State; and by the smaller local staffs in the districts of Umballa, Ludhiána, Delhi, Karnál, Jullundur, Amritsar, Gurdáspur, Siálkot, Lahore and Gujránwála; and from the 1st April to 1st November the districts of Hazára, Kulu, Lahoul, Simla, the Murree hills and seven Native States were visited. The strength of the establishment was the same as in previous year, but in the total number vaccinated there was an increase of 85,341.

In the cold weather of 1873-74 the districts of Kángra, Gurdáspur, Siálkot, Lahore, Gujránwála, Gujrat, and two tahsíls of Amritsar were completely covered; and considerable portions of the districts of Umballa, Ludhiána, Jullundur, Rawalpindi and Hoshiárpur, and, to a less extent, parts of the districts of Delhi, Karnál and Jhelum, were gone over by the district staff. In the hot season the districts of Hazára, Simla, and fifteen Native States, including the hilly tracts of Patiála, were vaccinated. The establishment received an addition of 8 members, while in the total number vaccinated during the year there was an increase of 61,546.

In the cold season of 1874-75 the districts of Umballa, Ludhiána, Jullundur, Gujrat, Jhelum and Rawalpindi, and the Native State of Kapurthála, were completely covered; and the greater portions of the districts of Hoshiárpur, Kángra, Amritsar, Siálkot, Lahore and Gujránwála, and of Delhi, Karnál and Gurdáspur, to a smaller extent, were vaccinated. In the hot season operations were carried through the Hazára and Simla districts, and twenty-one Native States, including Chamba and its sub-divisions, Pangi and Lahoul, were for the most part vaccinated. The number of Native Superintendents and vaccinators was 145, being less by 2 than in previous year; and the total number vaccinated was 374,615, exceeding the number of previous year by 31,293.

In the cold season of 1875-76 five districts, *viz.*, Delhi, Karnál, Lahore, Ferozepore and Gujránwála, and the Native State of Faridkot, were completely covered; and the districts of Umballa, Ludhiána, Jullundur, Hoshiárpur, Amritsar, Siálkot, Gurdáspur, Rawalpindi, Jhelum and Gujrat were also visited, from about one-half to two-thirds of the area of each having been gone over. In the hot season the districts of Hazára and Simla, Murree and the adjoining hills, together with six Native States, were vaccinated. The strength of the establishment remained the same, but, owing to the great prevalence of sickness obtaining throughout the Province in the autumn and early winter months, there was a decrease of 74,743 operations as compared with previous year.

In the cold weather of 1876-77 the districts of Jullundur, Hoshiárpur, Gurdáspur, Amritsar, Siálkot, Gujrat and Gujránwála, and the Native State of Kapurthála, were completely covered: and, in addition to these, operations were carried on by the District Native Superintendents in Ludhiána, Lahore, Ferozepore, Rawalpindi and Jhelum, and to a smaller extent in Delhi, Karnál and Umballa. In the hot weather operations were carried on in the Murree hills, and in the districts of Simla and Kángra. Vaccination for the first time was extended to Kashmir territory, the valleys of the Kishanganga and Jhelum rivers, including a considerable portion of Kashmir proper, having been covered; and the Native State of Mandi and seven of the Cis-Sutlej States were vaccinated. This year the returns showed a further diminution in the amount of work done, there having been a decrease of 11,345 in the total number vaccinated from those of the previous year; the strength of the establishment was increased by 5 members.

During the cold season of 1877-78, six districts were wholly, and fourteen partly, overtaken; and in the hot season operations were conducted in twelve Native States, including the Kashmir valley, in Simla, Murree and the adjoining hills, and in the district of Kángra. Four new districts, Rohtak, Hissar, Sirsa and Shahpur, were this year added to the Vaccine Circle. The total number vaccinated was 373,577, being an increase of 85,050 over that of previous year, the strength of the establishment remaining the same.

In 1878-79 four new districts, Gurgaon, Mooltan, Jhang and Montgomery, together with four old districts, and a Native State in the plains, were during the cold season covered; while work was carried on by the district vaccinators in sixteen other districts. In the hot season operations were carried through ten Hill States, the districts of Kángra and Simla, and Murree with the neighbouring hills. The establishment was this year increased by the addition of 4 Native Superintendents and 14 vaccinators, which completed the sanctioned number of the former, the latter remaining less than the sanctioned scale by 15; and there was an increase in the total number vaccinated of 17,952 upon those of the previous year.

In the cold season of 1879-80 twenty-one districts in the plains were visited, ten of which, together with a Native State (Faridkot), were, as regards area, fully, and eleven partly, overtaken. In the hot season operations were carried through fourteen Hill States, and the districts of Kángra, Simla and Hazára, and the hilly parts of Rawalpindi were visited, and for the most part vaccinated. On account of the excessive sickness and mortality among children from diseases of the Zymotic class (chiefly miasmatic fevers and small-pox), as well as from a diminished birth-rate arising from the long prevalence of sickness among the general population, the outturn of work this year showed a decrease of 80,406 from that of the previous year; the strength of the establishment was less by 4 vaccinators.

It is thus seen that from 1864 to 1869-70 the operations of the working seasons in the plains covered thirteen districts, or rather more than two districts a year; and that from 1870-71 to 1879-80, a period of ten years, the areas in the plains completely gone over comprised eight districts vaccinated once, seven twice, six three times, two four times, two five times, and six Native States, being equivalent to six districts a year, an increase of four districts compared with the yearly number covered during the first six cold seasons that the establishment had been at work. In addition to this, the local establishments of the Special Department worked in ten or eleven other districts annually, covering from about a half to rather more than two-thirds of the area of each, an amount of ground which, when added to the six districts just alluded to, gives a tract equal to eleven districts vaccinated every cold season during the last ten years. To this also must be added the work of the corresponding hot seasons, comprising an average of three British Hill Districts and eleven Native Hill States, visited every year. During this period the annual average number of Native Superintendents and vaccinators (in the proportion of about one of the former to four of the latter) was 146, being 37 under the sanctioned scale; and the average number vaccinated by each vaccinator was 2,056, against 1,509 in the first six years, the total number vaccinated being a little over 3 millions. According to the late census, the population of the Punjab is 17,596,134, and, taking the annual number of births, at the rate of 40 per mille of population, to be in round numbers 703,000, and reckoning that deaths, sickness, and protection by small-pox, combined, would probably lessen this number by one-fourth, there would be about 527,000 children for whose vaccination, assuming the average annual number vaccinated by each vaccinator to be 2,056, an establishment of no less than 257 vaccinators would be necessary. But computing that during the last ten years a tract equal to the combined areas of about only 15 of the 32 districts into which the Punjab is divided was, on an average, annually overtaken by 146 vaccinators, it is found that, to cover the whole of the Province every twelve months, an establishment of about 310 vaccinators including Native Superintendents would be required, more than double the number employed during the period in question. In making these calculations, however, it has not been taken into account that, irrespective of the number of vaccinators employed, there would be, under the voluntary system, a large residuum of the infantile population (about a third) annually withheld from the operation; to reach this a law of compulsory vaccination would be indispensable.

The total number vaccinated by the Dispensary Establishments, during the last ten years, aggregated 1,068,696 ; including temporary vaccinators, the annual average strength was 142, compared with 146 of the Special Department, while the annual average number vaccinated by each vaccinator was 752, against 2,056, a difference of 1,304 in favour of the vaccinators of the Provincial Establishment. In the Vaccination Report for 1865, Dr. Garden writes: "The old plan of entertaining vaccinators at Dispensaries during the cold season only, and of allowing them to work at a distance from the Civil Station, having been found to be extremely faulty, a new one has been substituted, and came into operation on the 1st of November. This arrangement is that two vaccinators are permanently attached, and no temporary ones allowed, and also that these men are kept at work in the city and villages near at hand where their work can be supervised by the Civil Surgeon. The vaccinators are kept more under control, and it is impossible for the returns to be so falsified as was formerly the case." With regard to the improvements here alluded to, I would merely observe that the objectionable system of employing temporary vaccinators has, to a greater or less extent, been continued up to the present time, and that, in not a few districts, vaccinators continue to work at long distances from head-quarters, where their operations cannot be efficiently supervised or controlled.

4. In the year under report the aggregate number of operations performed by all establishments, including those returned by the vaccinators employed by the Baháwalpur State (5,232), was 483,763, as compared with 381,166 in 1879-80, being an increase of 102,597 in favour of the past year. The total number of successful primary vaccinations, which had been 347,987 in 1879-80, was 440,007, an increase of 92,020 ; and the ratio of success, computing the unknown as unsuccessful, was 94·24 per cent. There were 16,883 re-vaccinations as against 11,674 of the previous year, and the percentage of success recorded was 53·31, as against 44·74 of the previous year. In former reports attention has been called to the fact that the returns, as far as re-vaccinations are concerned, are for the most part untrustworthy, arising partly from the inability of the vaccinators to distinguish with sufficient accuracy the points typical of success or partial failure, and partly from carelessness in attending to, or from ignorance of, the meaning of re-vaccination ; and the caution as to receiving the records under this head as genuine has to be repeated.

The aggregate cost, which had been Rs. 56,332-4-10 in the previous year, amounted to Rs. 63,313-0-10, an increase of Rs. 6,980-12-0 ; and each successful case cost annas 2 and pies 3·07, as against annas 2 and pies 6·62 of previous year.

5. The Provincial Establishment consisted of the following :—

1 Acting Superintendent General.
1 Superintendent.
1 Native Deputy Superintendent.
33 Native Superintendents.
138 Vaccinators.

The office of Superintendent of Vaccination for the Western Circle of the Province remained vacant till November, when it was taken up by Surgeon-Major G. Massy, who formerly held the appointment.

6. During the hot weather operations were carried through sixteen Native States, the Murree Hills, the district of Kángra, part of the Hazára District, and the sanitarium of Simla; and in the cold season, nine districts were wholly, and fifteen partly, overtaken. The district of Muzaffargarh was for the first time systematically vaccinated, and included in the circle, the vaccination of which is undertaken by the members of the Provincial Establishment.

7. Briefly shown, the year's record of the operations performed by the Provincial Establishment compared with 1879-80 is the following :—

Statement No. II.

Year.	Number of Native Superintendents.	Number of Vaccinators.	Total number of persons vaccinated.	Primary Vaccination. Total number.	Primary Vaccination. Total successful.	Primary Vaccination. Percentage of successful cases, including those unknown with the total as unsuccessful.	Average number done by each Vaccinator.	Cost of each successful case.
								Rs. A. P.
1879-80	32	132	311,123	301.835	288,141	95·46	2,356·99	0 2 7·43
1880-81	33	138	394,376	380,146	362,476	95·35	2,857·79	0 2 4·33

The total number vaccinated shows an increase of 83,253 over the declining number of the previous year, while it is higher by 2,847 than has ever been reached in any previous year ; and there is an increase of 500·8 in the average number vaccinated by each vaccinator, as compared with the previous year. The causes which were said to have brought about the large decrease of vaccinations in 1879-80, and which were shown in the report for that year to have been of an exceptional nature, having, to a great extent, been in abeyance during the year under review, the outturn of the year's work, as exhibited by the above statement, has fully regained, if it has not exceeded, the standard formerly attained.

The total expenditure of the Special Establishment amounted to Rs. 54,543-14-10, as compared with Rs. 47,731-14-5 expended during the previous year, whereas the cost of each successful case was annas 2 and pies 4·33, against annas 2 and pies 7·43 in the same year. With regard to the genuineness of the ratios of success returned by the vaccinators, it may be sufficient to state that, of 12,611 primary cases which came under my own inspection during the course of the year, only 97 failures were noted, giving a percentage of 99·23 successfully vaccinated, as compared with 98·69, the aggregate ratio calculated from the figures given in the vaccination returns when the unknown cases are excluded; when, however, these are included, the proportion of success falls to 95·35 per cent. I would here take the opportunity of explaining that, in accordance with the method adopted in para. 12 of Government of India, Home Department, letter No. 136, dated 28th May 1879, in calculating the ratios of success given in the appended statements, the unknown cases are included, and classed with the unsuccessful operations; but in the body of the report, to facilitate comparison with statistics collected previous to 1879, when the new system of calculation was introduced, it is deemed advisable to add, to the percentages thus worked out, the percentages which result when the unknown cases are excluded.

8. Sex and age of the vaccinated.

Statement No. III.

Year.	Male.	Female.	Under a year.	Above a year.
1879-80	52·8	47·2	54·77	45·23
1880-81	52·2	47·8	63·8	36·2

(*a*) *Sex.*—As has been noticed in previous reports, the results arrived at by comparing the proportions of the sexes operated on, differ but little from year to year. In a total of 394,376 cases, 206,008, or 52·2 per cent., were males, and 188,368, or 47·8 per cent., were females, a difference of 4·4 in favour of the former; in 1877-78, 1878-79 and 1879-80 these proportions were, of the former, 52·1, 53·35 and 52·8, and of the latter, 47·9, 46·6 and 47·2, respectively. From these figures it is not unreasonable to infer that, with respect to the total numbers operated on, the returns from which they are compiled are fairly accurate; for, were it otherwise the case, it is scarcely probable that, collected as they are from so many various sources, the same close approximation of results could, year after year, be arrived at.

(*b*) *Age.*—From the above statement it will be seen that considerable progress in infantile vaccination has been made during the past year. The number under a year successfully vaccinated is more by 73,641 than that of previous year, while it is higher by 47,710 than the highest figure attained in any year since the formation of the establishment. In 362,476 successful primary vaccinations in which the age was noted, 231,454, or 63·8 per cent., were under a year, and 131,022, or 36·2 per cent., were above a year, equivalent to an increase of 9·1 per cent. over the increasing proportion of previous year, and of 18·3 per cent. over that reached in 1878-79, in favour of infant vaccination. In the Hill States, however, infant vaccination continuing to be received with disfavour, on account of the risks supposed to attend the operation when performed on very young children, these proportions are reversed: the proportion under a year, which in the three preceding years had been 26·8, 22·5 and 22·7 per cent. respectively, was 26·8 per cent. in the year under review.

KANGRA DISTRICT.

9. This being one of the few districts of the Province in which vaccination can be carried on irrespective of season, all but the more mountainous and inaccessible parts can be overtaken once a year; and as there are few districts in which vaccination is so generally popular, so there is none, the population of which is so well protected from small-pox. This high degree of protection is shown not only by the insignificantly small number of deaths registered from small-pox, but also by the comparatively large proportion of children found to have good vaccination marks on their arms. According to returns obtained from the Sanitary Commissioner's office, the number of deaths registered from small-pox in 1880 was only 30, of whom 14 were above twelve years of age, being in the proportion of 0·04 per 1,000 of population; and during the previous five years the total number of deaths referred to this disease was 593, or at the rate of 0·16 per 1,000. In the school at Núrpur, of 109 scholars inspected by me, whose ages varied from about six to twenty years, it was found that 68·8 per cent. had been vaccinated successfully, 15·6 per cent. were marked with small-pox, 1·8 had marks of inoculation, and 13·8 had no marks at all; but in a small branch school in this town, in which the age of the oldest child did not exceed twelve years, the percentage of the vaccinated rose to 92·5, and none had marks of small-pox or of inoculation. In the villages among people of all ages the proportions were found to be 60·0 per cent. vaccinated, 32·7 inoculated, 3·2 marked with small-pox, and 4·0 had no visible marks. It may be safely stated that, as a general rule, throughout the greater portion of this district, the proportion of children under ten years of age seen to have marks of successful vaccination on their arms rarely falls below 90 per cent. These figures unquestionably show the rapid progress vaccination has been making in these parts, as well as the fact that, of late years, it is gradually taking the place of inoculation which used to be so freely had recourse to. The inoculators are now complaining that their trade is being spoilt by vaccination; and as their movements are closely watched by the local authorities, it is to be hoped they will be induced to give up the pernicious practice altogether. For this satisfactory state of things, great credit is due to Colonel Jenkins, the Deputy Commissioner, who, as in former years, continues to devote much attention to the propagation of vaccination among the people of his

district, and to use his best influence in discouraging inoculation. As mentioned in previous reports, the outbreaks of small-pox in this district are usually localized, and concurrent with the practice of inoculation, to which their continuation, if not their origin, can generally be traced.

During the year under review only one outbreak of the disease appears to have taken place: it occurred in a village about two miles from the cantonments of Bhagsu, and, although the source from which it arose is doubtful, there is no doubt but that the disease was kept up and spread by inoculation until the circumstances coming to the knowledge of the local authorities, arrangements were made to carry out vaccine operations in a rapid and systematic manner, when the epidemic gradually died out.

During the course of the hot season operations were carried through six tahsíls, and the following statement gives the results :—

Statement No. IV.

Tahsíls.		Total number vaccinated.	Ratio of successful cases per 1,000 of population.
Kángra	...	6,167	38·18
Palumpur	...	1,991	29·19
Sultánpur	...	5,958	67·47
Plach	...	3,798	81·19
Derah	...	10,025	73·70
Hamirpur	...	4,192	22·52
TOTAL	...	32,131	38·00

The very high ratios exhibited by Plach and Derah are due to the fact that in these tahsíls unusually large numbers of adults were successfully operated on. The total number vaccinated was 32,131, of which 23,955 were known to be successful, the ratio of success being 96·23 per cent. which, when the unknown cases are excluded, rises to 98·59.

SIMLA DISTRICT.

10. As usual, very great opposition was met with in the Simla bazárs, and no little difficulty was occasionally experienced in obtaining a sufficient number of subjects to keep up the vaccine virus throughout the hot season. The total number of cases vaccinated in this sanitarium was 250, being an average of only 42 a month; of these 96 per cent. were known to be successful. In the previous hot weather, operations, embracing an unusually large proportion of re-vaccinations among adults, were carried out on an extensive scale in the rural circles, and to this no doubt is to be attributed the complete immunity from small-pox which seems to have been enjoyed by the people of this district throughout the year under review; not a single death from this disease was recorded.

NATIVE STATES.

11. During the hot season operations were carried through 16 of the 18 Native States mentioned in the accompanying statement :—

Statement No. V.

Native States.		Total number vaccinated.	Native States.		Total number vaccinated.
Mandi	...	8,059	Theog	...	501
Suket	...	7,211	Mangal	...	33
Lambagraon	...	1,162	Madhan	...	286
Kutler	...	384	Kunihar	...	113
Nádaun	...	586	Komarsain	...	488
Dada Sibi	...	1,518	Keonthal	...	405
Chamba	...	6.297	Pataudi	...	68
Biláspur	...	3,431	Jammu	...	13
Arki	...	1,503			
Bhajji	...	926	Total	...	32,984

The total number vaccinated was 32,984, the ratio of success in primary operations being 95·31 per cent., including unknown; excluding these, the percentage is 98·47. The best results were obtained in Suket, which, owing to the excellent arrangements for carrying on the work made by Gurdial Singh, the Superintendent of the State, was very completely vaccinated. The Rajahs of Mandi and Biláspur, and the Rana of Arki, as in former years when vaccination has been performed in their States, gave every assistance, and very favourable results were attained. In Chamba, Lambagraon, Kutler, Nádaun and Dada Sibi the work was carried out under the immediate supervision of Pandit Bal Kishen, the Deputy Superintendent. The Rajah of Nádaon is reported by him to have taken no interest in the work, and to have given but little assistance.

HOSHIARPUR DISTRICT.

12. The results obtained in vaccinating this district in 1879-80 having been somewhat unsatisfactory, the ratio successfully vaccinated per 1,000 of population having been no more than 18·79, work was resumed in October, beginning with the tahsíl of Unah. Although this year's returns show a considerable increase over those of the preceding year, still, when compared with the numbers vaccinated in former years, the outturn cannot be said to be altogether satisfactory. But this is mainly

due to the fact that the greater portion of the district had been overtaken in the preceding cold season, two tahsíls having been done only six months previously. The following statement shows the distribution of the work in the different tahsíls :—

Statement No. VI.

Tahsíls.	Total number vaccinated.	Ratio of successful cases per 1,000 of population.
Hoshiárpur	5,850	21·65
Unah	3,669	16·29
Dasuyah	4,535	16·65
Garshankar	10,677	38·15
Total ...	24,731	23·00

The comparatively high ratio exhibited by Garshankar, 15 per 1,000 above the average of the district, is due to the fact that outbreaks of small-pox having occurred in several parts of the tahsíl at an early period of the cold season, it was considered necessary to practise re-vaccination, as well as the primary operation, on a larger scale than usual, in order to hem in and stamp out the disease. In some of the larger towns, according to the registers, 79 per cent. of the children under one year of age were successfully vaccinated, leaving 21 per cent., or about a fifth, unprotected. The total number vaccinated throughout the district was 24,731, of which in primary cases 94·62 per cent. were recorded successful, and excluding unknown 98·67. The number of deaths registered from small-pox in 1880 was 368, being in the ratio of 0·39 per 1,000 of population.

GURDASPUR DISTRICT.

13. In this, the next district entered on, operations were commenced about the middle of December, and brought to a close towards the end of January, the whole of the district, with the exception of the hilly portions of Pathankot, having been overtaken. Vaccination is carried on here every year by a Native Superintendent and four vaccinators, about half of the district being covered in the course of a season, but the whole of its area had not been systematically overtaken by the larger itinerating staff working under direct European supervision since 1877-78, a period of three years. Although the operation cannot be said to be altogether popular, no opposition of a serious nature was raised, the attitude of the people in many parts having been more apathetic than antagonistic. A considerable advance was made in some of the municipal towns. The following statement shows the distribution of the work in the different sub-divisions of the district :—

Statement No. VII.

Tahsíl.	Total number vaccinated.	Ratio of successful cases per 1,000 of population.
Gurdáspur	7,508	28·62
Batála	8,195	30·49
Shakarghar	7,678	29·56
Pathankot	2,962	17·29
Total ...	26,343	27·35

In the town of Batála, with a population of 24,989, the total number vaccinated was 1,164, of which in 334 primary cases inspected by me, 98·2 per cent. were found to be successful, and the number under one year of age known to be successfully vaccinated was 598. Up to within a recent period much opposition used to be met with in this town, the results of which are plainly to be seen in the extensive traces of previous small-pox to be found among the juvenile population. Among 415 scholars attending the chief school in Batála, I found that 228, or 54·93 per cent., were marked (many much disfigured) with small-pox, and only 79, or 19·03 per cent., had marks of successful vaccination, while 108, or 26·02 per cent., appeared to be unprotected, having no visible marks of either vaccination or small-pox. As the greater number of the members of the Municipal Committee, and several of the leading Hindús of the town, attended the inspection, and as a favourable opportunity of being able to demonstrate, by the most tangible proofs possible, the beneficial effects of vaccination here presented itself, I had the scholars drawn up in two lines—vaccinated and unvaccinated—for these gentlemen to examine for themselves. The contrast between the two classes was so great as to be seen at a glance, and none but the most prejudiced could fail to be convinced of the utility of the operation by the facts brought before them—that none of those marked with small-pox had marks of successful vaccination on their arms, and, conversely, that not one of the vaccinated was marked with small-pox. The members of the Municipal Committee took considerable interest in the work, and not a few of them voluntarily expressed themselves in favour of the provisions of the Vaccination Act being extended to this town. The ratios per cent. of the vaccinated and of those marked with small-pox in the schools of some of the other towns were: in Srigovindpur 20 and 51, in Kálanaur 35 and 38, in Dinanagar 37 and 37, in Barampur 45 and 33, and in Nyna Kot 70·6 (none marked with small-pox), respectively. A noticeable feature in these examinations was that the ratio of the vaccinated among the younger children—from five to ten years of age—was about double that of those over ten years, which shows that vaccination has of recent years been making considerable progress in this district. The total number of operations performed throughout the district was 26,343, of which in primary cases 94·51 per cent. were recorded as successful ; of 1,089 primary cases inspected by me, the ratio of success was 98·2 per cent. Small-pox is recorded to have caused 94 deaths in 1880, being in the ratio of 0·10 per 1,000 of population.

SIALKOT DISTRICT.

14. This district, the greater portion of which was overtaken in the months of February and March, had not been visited by the itinerating staff since the cold season of 1876-77, an interval of three years; but vaccination had been kept up by the Local Native Superintendent and four vaccinators, who, in that time, had systematically covered the whole of the district once and-a-half, being an average of two tahsíls a season, and vaccinated 45,753 persons. The attitude of the people is unusually favourable, and operations can be carried out with great rapidity and effect.

The following table gives the results in the different tahsíls:—

Statement No. VIII.

Tahsíl.	Total number operated on.	Ratio successfully vaccinated per 1,000 of population.
Siálkot	15,117	38·29
Pasrúr	10,316	41·13
Zafarwál	9,765	50·65
Raya	9,999	49·06
Total ...	45,197	43·34

Considering the comparatively large outturn of work effected every year in this district, the average ratio here shown, 43·34, is unusually high. Siálkot exhibits the lowest ratio per 1,000 of population, but holds the highest place in point of infantile vaccination: while the proportion of those successfully vaccinated under one year of age in the district generally averages 75 per cent. of the assumed annual birth-rate, that of the Siálkot Tahsíl exceeds this by 4·5 per cent.; again, of 15,117 persons vaccinated in this tahsíl, 12,093, or 80 per cent., were under one year of age, compared with 60 per cent., the average ratio of the other tahsíls. Of the total number vaccinated in the district, 45,101 were primary cases, of which the ascertained ratio of success (including unknown) reported by the vaccinators was 96·54 per cent.; whereas of 8,184 primary vaccinations inspected by me, 8,130, or 99·3 per cent., were found to be successful, the unknown being excluded from the calculation. In the town of Siálkot the total number of operations was 912, and the number of those under one year of age known to be successfully vaccinated was 755, against 1,013 births registered in 1880, equal to 74·5 per cent. Among 220 scholars attending the middle school in this town whose ages ranged from about seven to eighteen years, I found that 43·6 per cent. had been successfully vaccinated, and 43·3 had undergone attacks of small-pox, while 11·9 had no marks, and 1·2 had been inoculated; the great majority of the vaccinated were under twelve years of age. Here, also, as in Batála, the Members of the Municipal Committee and many of the better class Hindús were present at the inspection, and, having personally examined the results brought to their notice, were able to draw their own conclusions, which could not fail to be in favour of the operation. A discussion here arose as to the advisability of extending the provisions of the Vaccination Act to the Municipality of Siálkot, when it appeared that, an incorrect interpretation having been put upon the section dealing with the question of the lymph to be used, and a rumour having in consequence got abroad that operations would be performed with animal lymph, the Hindús had great objections to the introduction of the Act. This, however, I was assured by the Hindu gentlemen present, was the only part of the Bill to which exception could be taken, and on my giving them to understand that human lymph, as heretofore, would alone be used, they at once expressed themselves in favour of the application of the Act. I may here explain that this conversation arose in consequence of a proposal to apply the Vaccination Act to this town having, a few days before, been carried by a large majority of the Members of the Municipal Committee specially convened for this purpose. In this district only 21 deaths from small-pox were reported during the year, being equal to 0·02 per 1,000 of population.

AMRITSAR DISTRICT.

15. On the 18th March, following up the vaccinators who had preceded me by about a week, I crossed over from Siálkot into the district of Amritsar. This district had last been systematically overtaken under European supervision in the season of 1876-77, a local staff of one Native Superintendent and four vaccinators having continued the work in the three intervening seasons, covering the district twice and performing altogether 30,287 operations, being less by a third than the number accomplished during the same period in the Siálkot District by the same number of vaccinators. Although, no doubt, a considerable proportion of the unprotected were this year, as usual, withheld from the operation, the antagonistic spirit displayed in not a few parts of the Amritsar Tahsíl in 1877 was not met with. In the tahsíls of Tarn Táran and Ajnála the operation may be said to have become fairly popular. The following table shows the amount of work accomplished during the latter half of the month of March, but as only the tahsíl of Ajnála was completely covered, considerable tracts of other portions of the district

having been overtaken in the following month, all the operations performed on the occasion of the present visit are not shown:—

Statement No. IX.

Tahsíl.	Total number vaccinated.	Ratio of successful cases per 1,000 of population.
Amritsar	3,729	12·86
Ajnála	7,826	34·60
Tarn Táran	3,181	12·16
Total ...	14,736	18·86

Of the total number of operations, 10,478 known to have been successfully vaccinated were under a year, being equivalent to 71 per cent. of the whole. In the tahsíl of Ajnála, the only one which, as already stated, was completely covered, the proportion of the infantile population successfully vaccinated to the assumed birth-rate was 66·01 per cent. The recorded ratio of success in primary cases did not exceed 93·63 per cent., but when the unknown cases are excluded from the calculation, the percentage reaches 98·04. The number of deaths referred to small-pox in 1880 was 50, being in the proportion of 0·06 per 1,000 of population.

16. This concludes the work, aggregating 176,372 operations, and covering three and-a-half districts in the plains, and one British district together with eleven Native States in the hills, accomplished during the year by the staff of vaccinators employed under my immediate supervision.

17. *Establishment of Superintendent.*—Dr. Massy resumed charge of this office, which had been vacant since the end of March 1879, on the 23rd November at Rawalpindi, and commenced operations with an establishment of five Native Superintendents and twenty vaccinators, which was subsequently supplemented by the district staffs of Jhelum and Gujránwála, comprising in all seven Native Superintendents and twenty-eight vaccinators. The districts of Rawalpindi, Gujránwála, Jhang, and one tahsíl of Mooltan were visited during the cold season, and for the most part vaccinated. A resumé of the operations performed in these districts is given as follows:—

(*a*) *Rawalpindi District.*—Operations, which had been begun in the first week of October, were brought to a close about the end of December, five tahsíls having during that time been overtaken; the tahsíl of Murree was vaccinated in the hot weather months; that of Kahuta was not visited. The total number vaccinated was 19,160, and the ratio of success in primary operations was 93·80 per cent. including unknown cases, and excluding these, 98·80; the ratio successfully vaccinated per 1,000 of population was 25·15. The returns show considerable inequality in the distribution of results in some of the tahsíls. In the tahsíl of Pindigheb the ratio of the assumed birth-rate successfully vaccinated is 69·4 per cent., in the tahsíl of Attock 53·3, while in that of Rawalpindi it is as low as 45·18. The number of deaths referred to small-pox in the district in 1880 was 101, being in the ratio of 0·14 per 1,000 living.

(*b*) *Gujránwála District.*—The popularity with which vaccination has been received in this district for the last ten years continues undiminished, and the degree of thoroughness with which it can be carried out may be said to depend on the energy of the vaccinators. The total number vaccinated was 20,223; of these, in primary cases 94·69 per cent. were returned as successful, as against 99·2 when the unknown cases are not taken into account; the ratio of successful vaccinations per 1,000 of population was 34·73, an unusually high proportion, considering that the district is covered every cold season by the local staff of the Special Establishment; and the proportion of the assumed birth-rate successfully vaccinated was 72 per cent., which is also comparatively high. The number of deaths from small-pox in 1880 was 64, equal to 0·12 per 1,000 of population.

(*c*) *Jhang District.*—On entering upon this district, Dr. Massy found that two tahsíls, Jhang and Shorkot, had already been gone over by the Dispensary vaccinators. Commencing operations in the tahsíl of Chiniot great success was attained, 7,110 vaccinations having been performed, and the ratio successfully vaccinated per 1,000 of population having reached the high figure of 77·2. Following up the Dispensary vaccinators, who had gone over the same ground but a short time previously, Dr. Massy's staff succeeded in vaccinating 4,527 persons (4,443 being primary cases) in the tahsíl of Jhang; but in that of Shorkot, which had been more carefully done in the first instance, the number vaccinated did not exceed 856, a result by no means commensurate with the extent of area covered, or the time spent in accomplishing the work. Dr. Massy's remarks regarding the work done by the Dispensary vaccinators in this district will be referred to later on under the heading of Dispensary Vaccination.

The total number vaccinated by the Special Establishment was 12,493; percentage of success in primary cases 95·34 including unknown, and excluding these 98·92; ratio successfully vaccinated per 1,000 of population was 33·79, which, when the vaccinations performed by local agency are added, rises to 55·90. Number of deaths registered from small-pox in 1880 was 104, being equivalent to 0·30 per 1,000 of population.

With regard to the attitude of the people Dr. Massy writes: "The Jhang District is comparatively new to vaccination, and inoculation is still practised, although less than formerly; and I found the people more easy to deal with this year than I did in 1879." "I received every assistance," he continues, "from the local authorities, except in the instance of Khuda Bakhsh, Tahsíldár of Jhang, who held aloof and gave no assistance whatever. Murad Alí, Tahsíldár of Chiniot, on the other hand took a lively interest in the work, and both this year and in 1879 his services were invaluable. I beg to bring his name to the favourable notice of Government.

(*d*) *Mooltan District.*—Only one tahsíl of this district, Sarai Sidhu, was entered on by Dr. Massy's staff before the year under report came to a close. The total number vaccinated in the district was 7,003, which embraces 3,153 operations performed in the tahsíls of Shujahabad and Lodhrán by the District vaccinators of the Special Establishment during the early part of the vaccinating season. The ratio of success in primary cases amounted to 94·85 per cent., against 98·45 when the unknown cases are left out of the calculation; the proportion of cases successfully vaccinated per 1,000 of population in the district was 14·08. The number of deaths referred to small-pox in 1880 was 203, equal to a rate of 0·44 per 1,000 living.

18. Early in December, Pandit Bal Kishan, the Deputy Superintendent, was deputed to carry on operations in the district of Montgomery, and, towards the latter part of the season, in that of Muzaffargarh, with a staff of five Native Superintendents and twenty vaccinators. A brief summary of the results is here given:—

(*a*) *Montgomery District.*—This district, visited for the first time in the cold season of 1878-79, was entered on about the beginning of December, and finished about the end of January. With the exception of the tahsíl of Montgomery, the vaccination of which had, with no small difficulty, been effected in the earlier part of the season by the Local Native Superintendent, the work was fairly well carried out, every assistance having been received from the Local Authorities. Total number vaccinated was 17,058; percentage of success in primary operations 96·84, as against 98·75 when the unknown cases are excluded; and ratio successfully vaccinated per 1,000 of population 45·79. Number of deaths from small-pox in 1880 was 185, being in the proportion of 0·51 per 1,000 living.

(*b*) *Muzaffargarh District.*—This district, taken in hand in the second week of February and, with the exception of a small portion of the tahsíl of Alípur, covered by the 31st March, the close of the vaccine year, had never before been visited by the vaccinators of the Provincial Establishment. Mr. O'Brien, the Deputy Commissioner of the district, took much pains to get the work established on a satisfactory footing, and to the excellent arrangements made by him is doubtless, in great measure, due the success with which it was carried out. Previous to, as well as during, the time vaccination was being performed, small-pox is reported to have been prevalent over a large portion of the Sanawan Tahsíl, but is said to have very much declined, or altogether died out, shortly after the vaccinators had succeeded in overtaking the epidemic area. The Tahsíldár of Muzaffargarh, Brij Náth, is said to have frequently accompanied the vaccinators when at work, and given them valuable assistance. Total number vaccinated 23,303; of these, in primary cases 95·82 per cent. were returned as successful, against 98·32 per cent. excluding unknown. This being a new district, the ratio (84·75) successfully vaccinated per 1,000 of population is considerably above the average; and taking the assumed birth-rate as the basis of calculation, the ratio of the infantile population successfully vaccinated is 79 per cent. The number of deaths from small-pox registered in 1880 was 855, being equal to a rate of 2·89 per 1,000 living.

19. There now remain to be briefly noticed fifteen other districts in which operations, to a greater or less extent, were carried on during the cold season by the local staffs belonging to the special establishment. The results are shown in the subjoined statement:—

Statement No. X.

District.	Total number vaccinated.
Delhi	8,815
Gurgaon	7,024
Karnál	3,105
Hissar	15,044
Rohtak	5,946
Sirsa	154
Umballa	6,240
Ludhiána	8,210
Jullundur	14,742
Lahore	17,577
Ferozepore	8,831
Jhelum	3,085
Gujrat	14,330
Shahpur	5,292
Hazára	369
Total ..	118,764

Wide differences in the numbers vaccinated are seen to obtain in the various districts, a result which mainly depends on the fact that very few districts are alike as regards the attitude of the people towards the operation. In Hissar a marked increase has this year taken place; the numbers vaccinated, which had been, respectively, 6,293 and 6,282 in the two previous years, rose this year to 15,044. On inspecting the work in this district I found the people more than usually favourable, while in the neighbouring district of Rohtak, the operation continues to be, in not a few places, strongly opposed. The Karnál District is still the most backward in the Province. Operations were not systematically carried on in Jhelum, Hazára and Sirsa; hence the low proportions exhibited by these districts. The total aggregate of operations performed by the district staffs was 118,764, of which in primary cases 95·33 per cent. were returned as successful, and excluding unknown 98·78. Of 875 recently performed operations which came under my inspection, only 6 were found to have failed, giving a ratio of 99·31 per cent. successful.

DISPENSARY VACCINATION.

20. The following table, showing the results of the year's operations performed by the various establishments, is compiled from the Dispensary Returns:—

Statement No. XI.

Number of vaccinators.	Class of Vaccinators.	Total number vaccinated.	Successful.		Percentage of success.		Average number done by each vaccinator.	Cost of each successful case.		
			Primary vaccinations.	Re-vaccinations.	Primary vaccinations.	Re-vaccinations.		Rs.	A.	P.
33	Vaccinators, Dispensary ..	36,931	32,246	421	89·08	57·20	1,119·12	0	1	8·9
34	Do. Municipal ..	22,590	19,544	544	89·48	72 63	664·41	0	2	2·5
22	Do. Local ..	16,374	14,216	364	89·50	74 13	744·27	0	1	7·6
19	Hospital Assistants ..	4,575	4,274	44	95·18	51·76	240·78	0	0	0
4	Cantonments ..	3,685	3,275	162	94·24	77·14	921·25	0	2	1·7
4	Native State ..	5,232	3,976	322	81·97	84·29	1,308·00	0	1	9·4
116	Total ..	89,387	77,531	1,857	89·38	69·99	770·57	0	1	9·20

In 79 Dispensaries, including 4 in the Native State of Baháwalpur, a total aggregate of 89,387 vaccinations were performed by 116 vaccinators, an increase of 19,344 over the previous year, while there is a decrease of 8 in the number of vaccinators employed. In recent years, however, a considerable decrease in the outturn of work accomplished by the different local agencies has taken place: in the last three years, including the year under review, the average annual number vaccinated has been 83,274, while the average of the five preceding years reached 130,508—a difference of 47,234. This decrease has been brought about by cutting down to a great extent the number of temporary vaccinators employed, who, on account of their inefficient training and general incompetency, as has frequently been alluded to in previous Reports, have been the means of rather retarding than promoting the acceptance of vaccination by the people. At the same time, in most of the districts visited by the staffs of the Special Establishment, the Dispensary vaccinators in permanent employ, many of whom were also found to have been inadequately trained, have, under efficient tuition, been induced to give up the useless, effete system of vaccinating with "crusts," and been taught to perform the operation with fresh lymph from the arm; and although, owing to the smaller number of men employed, a serious falling-off in the number annually vaccinated has taken place, this has been more than compensated for by the great improvement effected in the quality of the work. In a few districts, crusts, no doubt, are still used; but this method of working will, it is to be hoped, shortly be abandoned altogether. The practice, as far as I know, is peculiar to this country, and why it should have been clung to with such tenacity for so many years, is difficult to explain; for one more calculated to bring the prophylactic powers of vaccination into contempt it would be impossible to devise.

The number of operations performed by Dispensary vaccinators paid from Provincial Funds was 36,931, against 33,506 of the preceding year; the number of vaccinators being the same.

A total of 22,590 vaccinations was performed by Municipal vaccinators, being an increase of 9,255 over those of the previous year, and the number of vaccinators was greater by 11.

The total number of operations performed by vaccinators paid from Local Funds shows an increase of 2,566, while the number of men employed is less by 6.

There were 19 Hospital Assistants who, in a desultory way, were engaged in vaccination work, being less by 10 than the number of the previous year; they performed 4,575 operations, being an increase of 1,729.

Vaccinations performed by vaccinators paid from Cantonment Funds show an increase of 1,663.

(*a*) *Delhi District.*—In addition to the six vaccinators permanently employed by the Municipality of Delhi, two men were temporarily engaged for the last three months of the cold season. The total number vaccinated in the city and suburbs—4,871—shows an increase of 1,711 over previous year; of these, 86·32 per cent., including unknown cases, were successful; but excluding these, the percentage of success is seen to be 95·10; and the ratio successfully vaccinated per 1,000 of population was 26·10 against 16·53 of previous year; while of the infantile population, according to the birth register, the ratio known to have been successfully vaccinated was 29·94 per cent. I inspected the work on the 18th and 19th of February, and found the same opposition being met with, and the same absence of interest in the operation on the part of the Members of the Municipal Committee, which have so frequently been remarked upon in former Reports. Although the city had, at the commencement of the cold season, been divided into a certain number of circles, to each of which a Member of the Municipal Committee had been told off for vaccination purposes, to be present occasionally, as leisure allowed, with the vaccinators, when work was being done, and to use his personal influence with the people of the higher classes, who, as a body, continue to hold themselves aloof, it would appear that no efficient means to carry out the scheme had ever been adopted. With few exceptions the cases inspected by me were of the lowest castes, and spread in the most desultory, indefinite manner over a large area—a system of working which can never be the means of bringing the benefits of the operation home to the mass of the people. The quality of the lymph in use was, for Dispensary vaccination, exceedingly good, but the vesicles in most of the cases seen were not sufficiently numerous, nor was the surface covered by them sufficiently large to produce the full effect, or to confer that degree of protection which the operation is capable of producing. As the pay of the vaccinators kept in permanent employ, *viz*, Rs. 8 a month during the working, and Rs. 4 a month during the non-working season, is not sufficient to secure the services of capable, fairly well-educated men, I addressed a letter (No. 685 dated 25th February 1881) to the President of the Municipal Committee recommending that their salaries should be raised to Rs. 10 and Rs. 7 a month during the working and non-working seasons respectively—the pay of a 3rd class vaccinator of the Provincial Establishment—but to this the Members, at a general meeting held on the 7th March, declined to accede; the reasons alleged against the proposal being that the strength of the vaccine staff had, during the latter half of the season, been augmented by the addition of two temporary men, and that the Civil Surgeon did not support the recommendation. At the time I inspected the work, small-pox was said to be prevalent in certain parts of the city; but from the 1st January to the 18th February (the date of inspection), only one fatal case had been reported at the Municipal office. In 1880 only one death from small-pox in the city was recorded; and in the rural circles, in which the degree of protection is also comparatively low, the immunity from this disease seems to have been complete, no deaths from it having been entered in the registers. In the town of Sonepat 153 vaccinations were performed; the operations were done from arm to arm, and all were successful.

(*b*) *Umballa District.*—Two permanent and three temporary vaccinators, paid from Municipal Funds, were employed, two in the town of Umballa, and one in each of the towns Jagádhri, Shahabad and Sadhaura. Of a total of 3,382 operations, which had been 2,200 in the previous year, 2,160 were performed in Umballa, 531 in Jagádhri, 263 in Shahabad, 403 in Sadhaura, and 25 in Thanesar, the respective ratios of success in primary cases, including unknown, being 89·98, 78·92, 71·42, 66·41 and 100 per cent. In the town of Umballa the work was carried out in a very systematic manner, and the quality of the vaccinations inspected was found to be exceptionally good. With regard to the work done in the other towns mentioned, Assistant Surgeon Duni Chand states that it was favourably reported on by Dr. Bateson; but, according to the returns submitted by the vaccinators, the average percentage of success, excluding unknown cases, did not exceed 83·61, as compared with 97·84, the ratio attained in the town of Umballa. In this town the rate per 1,000 of population successfully vaccinated rose from 57·65 in 1879-80 to 72·47 in the year under review; and the proportion of the estimated number of births successfully vaccinated was 86·64 per cent. These ratios are very high compared with other towns of the Province, and much credit is due to Dr. Bateson and Assistant Surgeon Duni Chand, through whose exertions these successful results have been attained. In the town of Umballa only one death was referred to small-pox in 1880; in the district generally the number was 448.

In the Cantonment bazárs a total of 1,400 operations was performed by a vaccinator paid from Cantonment Funds; of the primary cases, 93·95 per cent. are returned as successful, but excluding those unknown the percentage rises to 97·02.

From the Rúpar sub-division a total of 2,431 vaccinations performed by two Municipal vaccinators is returned by Assistant Surgeon Brij Lál, in charge of the Rúpar Dispensary; of these, in primary operations 93·35 per cent. are reported to have been successful. The work in the town and adjacent villages is said to have been occasionally inspected, but in the more outlying villages the vaccinators would not appear to have been under any supervision or control.

(*c*) *Ludhiána District.*—In the town of Ludhiána two temporary vaccinators paid from Municipal Funds were employed during the last four months of the cold season. Dr. Rouse, in his report for this town, returns a total of 1,207 vaccinations with a percentage of 96·68 successful and a ratio of 28·89 successfully vaccinated per 1,000 of population, against 24·05 of the preceding year. The work was carefully supervised both by Dr. Rouse and Assistant Surgeon Bhagwán Dás, the latter regularly accompanying the vaccinators when operations were being carried on. The native gentlemen specially mentioned as having afforded efficient assistance are Mahbub Ali Shah, Chaudri Eshar Singh, and Mir Nizám-úd-dín, Members of the Municipal Committee. In the town of Jagraon 404 vaccinations were performed by the Hospital Assistant in charge of the dispensary, with a percentage of 97·52 reported successful. The number of deaths assigned to small-pox in the towns and rural circles, which had been 2,444 in 1879, declined to 44 in 1880,—a result in great measure due to systematic vaccination having been carried through the district in the preceding season by a large party of vaccinators belonging to the Special Establishment.

(*d*) *Amritsar City.*—The city establishment for the first two months of the season consisted of one permanent and two temporary vaccinators; one of these, having proved incompetent, was discharged in January, and two men, who as candidates for employment in the Special Establishment had undergone a short course of training, were at the same time entertained. The total number vaccinated was 3,019, a decrease of 369 from previous year; of the primary vaccinations, 95·87 per cent. were reported successful, and excluding unknown 98·08; and the ratio successfully vaccinated per 1,000 of population was 21·01. Of 7,064 births returned during the year, 1,890, or 26·75 per cent., were successfully vaccinated. I inspected the work on the 19th November, which left nothing to be desired in point of quality, but, as in former years, great opposition was being encountered, and no efficient arrangements for carrying out operations in a systematic way having been made by the Municipal Authorities, the time of the four vaccinators was being wasted over an amount of irregularly distributed work, which could have easily been accomplished by one man. The vaccinators were under little or no supervision, nor was any assistance being afforded them. As suggested in a letter addressed by me to the President of the Municipal Committee, pointing out the defects above mentioned, a plan of operations similar to that recommended to be carried out in the city of Delhi was proposed and agreed to at a general meeting of the Committee; but the scheme did not appear to have ever been seriously taken up, as, on my second visit to the city, about the end of March, no improvement on the former condition of things was discernible. It must be said, however, that the head vaccinator reports that he received fairly good assistance from two Members of the Municipal Committee, Babu Mola Lál and Sheikh Khair-úd-dín. There was no epidemic of small-pox during the past year.

(*e*) *Lahore District.*—The city establishment, comprising three permanent and two temporary vaccinators, worked, as usual, under the supervision of Assistant Surgeon Brij Lál Ghose, Rái Bahádur. The total number vaccinated in the city, including 168 operations at the Mayo Hospital, was 3,265—an increase of 348 over the previous year; the ratio of success in primary vaccinations was 87·51 per cent., but when the cases which escaped inspection are excluded from the calculation, the ratio rises to 95·14; the ratio successfully vaccinated per 1,000 of population in the city and suburbs, which in 1879-80 had been 16·94, was 22·31 this year. Assistant Surgeon Brij Lál Ghose, in his report, observes that a great improvement in the proportion of successful primary cases has taken place since the introduction of arm-to-arm vaccination, but, although no doubt very satisfactory results have by this means been obtained, he is in error in saying that the proportion of success in primary cases has risen 13·6 per cent. in the year under review, as compared with 1879-80; for, on examining the returns for the two years in question, it is seen that the rise amounts to no more than 0·85 per cent. The vaccinations examined by me on the 18th November had been very efficiently performed, but, as in the cities of Delhi and Amritsar, no attempt at systematic work, owing to absence of efficient arrangements, and lack of the necessary aid, was being made, and the daily average number vaccinated was insignificantly small compared with the strength of the staff employed. Assistant Surgeon Brij Lál Ghose writes very hopefully regarding the attitude of the people towards the operation, but my experience does not support his statements on this point. He mentions the names of Rái Mal Singh, Diwan Dás Mal, and Nawáb Abdul Majíd Khan, Ráises of the city, as having given the best assistance. The work during the season was frequently inspected by the Assistant Surgeon, and twice by Dr. Fairweather, the Civil Surgeon, who reports favourably on the way it was carried out.

From Kasur the Assistant Surgeon in charge of the dispensary reports a total of 1,113 persons vaccinated—525 within Municipal limits and 588 in the adjacent villages—by a vaccinator paid from Municipal Funds. Throughout the district the number of deaths referred to small-pox in 1880 was 171, being in the ratio of 0·22 per 1,000 living.

(*f*). *Ferozepore District.*—Two permanent vaccinators, paid from Provincial Funds, were employed, performing a total of 1,600 operations in the town and adjacent villages. In primary vaccinations the ratio of success, which had been 87·08 and 90·14 per cent. in 1878-79 and 1879-80 respectively, rose to 94·93 in the present year, or when the unknown cases are not taken into account 96·32 per cent. Three years ago vaccination was in a very backward state in this town; the vaccinators had for many years adhered to the practice of operating with "crusts," and their work had always been of the most inferior description. The great improvement now observed was entirely brought about by their having been taught to vaccinate direct from the arm, a method of operating which these men for the first time saw and practised when the district was visited by the vaccinators of the Special Establishment about four years ago. Dr. Murphy reports that in this town only 2 deaths from small-pox were recorded in 1880, against 55 in the previous year. "This is, in my opinion," he observes, "a most excellent result of the vaccine operations performed here." In the town and rural circles the aggregate number of deaths referred to small-pox, which had been 2,003 in 1879, declined in 1880 to 94.

(*G*(*Mooltan City.*—Two permanent vaccinators, paid from Municipal Funds, were employed, performing a total of 1,424 operations, against 1,510 in the previous year; in primary vaccinations the ratio of success was 97·04 per cent., and excluding unknown 98·14; and the ratio successfully vaccinated per 1,000 of population, including the suburbs, was 27·16. With reference to the attitude of the Municipal Committee towards the Vaccination Act, Dr. Gray in his report observes:—"The question of compulsory vaccination has been raised: the Native Members of the Mooltan Municipal Committee record an unanimous opinion in favor of the measure which has now become enrolled in the statute book. Hitherto it has been chiefly by means of the influence of the Native Members of the Municipal Committee that we have carried on vaccination, and sometimes the effectual exercise of their influence has cost them no little personal trouble. It is not unnatural that having voted for compulsory vaccination, and knowing that the bill they voted for has become law, they should look for some relief from the responsibility and trouble connected with voluntary vaccination. * * * * I wish here to record," continues Dr. Gray, "my appreciation of the services rendered to the cause of vaccination by some of the present as well as former Members of the Municipal Committee in past years. I would mention specially Makhdum Pir Shah, Seth Nesti Dás, Syad Hámid Shah, Nawáb Ashak Muhammad Khan, Razáda Tola Rám, and lastly Seth Ganga Rám, who, although he is not now a Member of the Municipal Committee, and has not actively assisted for some years past, was one of the most enthusiastic supporters we had at the time vaccination was first practised on a large scale in the city. Iláhi Bakhsh, Dároga of the conservancy establishment, and Mul Chand, registrar of births and deaths, have also given us valuable aid. * * * * * * * * Assistant Surgeon Jaswant Rái deserves the highest praise for the uniform zeal and tact he has displayed in conducting vaccine operations, and for the pains he has taken to make vaccination popular."

(*h*) *Jhang District.*—An establishment of thirteen vaccinators—three permanent, paid from Provincial and Municipal Funds, and four temporary, paid from Local Funds, and six Hospital Assistants—was employed in the towns and rural circles. The aggregate number of vaccinations was 8,157, being an average of 627 cases vaccinated by each vaccinator; the ratio of success of primary vaccinations was 96·97 per cent., and excluding unknown 97·72. Dr. Massy, who, as has been mentioned in a former part of this Report, visited the district in the month of February with a large staff of vaccinators, in comparing the outturn of work accomplished by the two sets of men, Dispensary and Provincial, points out that, while the ratio vaccinated per 1,000 of population in the tahsíls of Jhang and Shorkot, the area covered by the former, was 30·53, the ratio attained by the latter in Chiniot, the only tahsíl which had been left untouched by the local vaccinators, was 55·32—a difference of 24·79 per 1,000. Dr. Massy in his Report bears testimony to the great attention devoted to the subject of vaccination by the Medical Officer of the district. "Great praise," he writes, "is due to the Civil Surgeon, Chetan Shah, Rái Bahádur, for his indefatigable exertions. This officer possesses an extraordinary amount of influence amongst his own countrymen, and, owing to the small European community in the station of which he holds medical charge, his presence is rarely required, and he is able to go about his district in the cold season, using his best energies in the cause of vaccination. * * * * * * * I carefully examined a large number of primary operations performed by the Dispensary vaccinators and consider the quality of work which came under my notice quite equal to that done by the Special Establishment. The Native Superintendents were also directed to examine the quality of the Dispensary work, and the following table shows the results of their inspections :—

Statement No. XII.

Successful Primary Vaccinations				Number of unsuccessful primary vaccinations.	Percentage of successful cases.
With one vesicle.	With two vesicles.	With three vesicles.	With four vesicles.		
59	92	127	1,730	52	97·08

These results reflect very great credit on the Civil Surgeon, as I know that vaccination was in a very bad state when he took over charge of the district; indeed, so bad did I consider the quality of the work in 1879, that I wrote to the Civil Surgeon then in charge, and suggested his sending his men with the Provincial vaccinators to learn their work, which he did, and I believe that some of these very men compose part of the staff now employed by the present Civil Surgeon." With regard to the inspection of the work Assistant Surgeon Chetan Shah reports: "The work in the head-quarter towns was frequently inspected by the Civil Surgeon, and that in the rural circles as often as his other duties allowed him to do so. Altogether the Civil Surgeon inspected vaccination work in 60 villages. Many of these villages lying on or near the road to branch dispensaries were inspected more than twice. Moreover, the villages within five miles of the outlying dispensaries were frequently inspected by the Dispensary officers." With regard to the supervision exercised by Hospital Assistants, the class of Dispensary officers probably here referred to, who, it is presumed, themselves performed the vaccinations they are said to have inspected, it must be said that, as a rule, they possess but little skill as vaccinators, and as it is exceptional to find them taking any but a perfunctory interest in vaccination work, their reports are to be received with doubt. Assistant Surgeon Chetan Shah is very sanguine as to the ultimate success to be achieved by the voluntary system of vaccination in this country, and, in illustration of what he seems to think may ultimately be the attitude of the people towards the operation, he cites the following curious fact:—"Some Hindu families of Kot Isa Khan (though only few at present) have made vaccination a permanent institution in their family by performing some religious rites, and asserting that their descendants shall observe vaccination just the same as they observe 'mundan' (cutting hair from a child's head for the first time), or 'chola' (putting on the first shirt on the new infant)."

(*i*) *Montgomery District.*—Two permanent vaccinators, paid from Provincial Funds, were employed, performing a total of 2,033 operations, of which 97·02 per cent., in primary operations, were returned as successful, or, excluding unknown, 99·44. "Crust" vaccination, which until 1879 used to be the rule here, has now, it is to be hoped, been abandoned in favour of the arm-to-arm method of operating; the two district men, having undergone a regular course of training, may now be said to have become efficient vaccinators. This condition of things is a great improvement on that reported on by Dr. Massy, who, when he visited this district in 1879, found the work of the local men practically worthless. These men worked in conjunction with the vaccinators of the Special Establishment, by whom the district was overtaken during the first three months of the season under review.

(*j*) *Muzaffargarh District.*—An establishment consisting of two permanent and three temporary vaccinators, paid from Provincial and Local Funds respectively, was employed, performing altogether 2,532 operations, of which 85·70 per cent. are returned as successful, or, excluding unknown, 90 per cent. Pandit Bal Kishan, the Deputy Superintendent, on commencing operations with his staff in this district towards the close of the season, found the Dispensary vaccinators, both permanent and temporary, so incompetent, their work being for the most part of little or no value, that it was considered advisable to place them under a Native Superintendent to be taught vaccination from the beginning as if they had been quite new to the business.

(*k*) *Kohát District.*—Two vaccinators, paid from Provincial Funds, were employed, performing a total of 1,996 vaccinations, with 89·97 per cent. successful, or 92·76 when the unknown cases are excluded. These men, it would appear, worked in most parts of the district in a desultory way, and under but little supervision or control. Although their returns show a fairly good average of success, the Civil Surgeon does not consider the results of the operations satisfactory.

(*l*) *Bannu District.*—Four vaccinators—two paid from Local, one from Municipal, and one from Provincial Funds—were employed ; total number vaccinated was 6,023, against 12,734 in 1878-79 and 9,799 in 1879-80; the ratio of success in primary cases was 82·19 per cent., and excluding unknown 88·56. The falling-off in numbers vaccinated is ascribed to the disturbed state of the border. Small-pox was very prevalent during the year 1880, a total of 1,559 deaths having been registered from this disease, giving a death-rate of 5·42 per 1,000 of population, the highest in the Province for that year.

(*m*) *Dera Ismail Khan District.*—Eight vaccinators,—four paid from Provincial and four from Local Funds—worked in this district, and performed a total of 6,710 vaccinations, an increase of 468 over the previous year; the ratio of success in primary cases was 87·45 per cent., or, excluding unknown cases, 90·19. In the tahsíl of Leia, in which the carrying out of arm-to-arm vaccination is said to be almost impossible, the method of vaccinating with " crusts" is still adhered to. Although inoculation continues to be resorted to in many parts of the district, the practice is reported by Dr. Haig, the Civil Surgeon, to have been put a stop to in the tahsíl of Bhakkar, and to have diminished in the district generally. The number of deaths referred to small-pox in 1880 was 2,074, equivalent to a death-rate of 5·25 per 1,000 of population. This and the neighbouring district of Bannu show the highest mortality from small-pox in the Punjab, the average ratio of the two being 5·33 per 1,000 living, as against 0·52 the average rate of the Province generally.

(*n*) *Dera Gházi Khan District.*—Two vaccinators paid from Provincial Funds, and a compounder attached to the Police Hospital, were engaged in vaccination, one at a considerable distance from head-quarters in the tahsíl of Jaunpur, another in the town of Dera Gházi Khan, and the third in the villages adjoining. The total number vaccinated, which had been 1,890 in 1879-80, was 4,596, of which in primary operations the ratio of success was 85·52 per cent., and excluding unknown 89·04. Dr. Emerson reports favourably on the success attained by the vaccinator who worked in the town, but the work of the men employed in the rural circles does not appear to have come under his personal supervision. In the Rájanpur sub-division two vaccinators—one paid from Provincial and one from Local Funds—performed a total of 1,323 vaccinations, against 2,213 in 1879-80, a decrease of 890; in primary operations the percentage of success was 82·79, and excluding unknown 87·37. Regarding the trustworthiness of the returns, Dr. Hancock, the Civil Surgeon, remarks : " In 1879-80 there was little if any supervision exercised over the vaccinators, and the totals arrived at must, therefore, be regarded with great suspicion. During this last year (1880-81) more attention has been paid to the matter, and occasional inspections have been made to verify the statements of the vaccinators. I think, then, that this return is probably fairly accurate." Throughout the district there were 254 deaths from small-pox registered in 1880, equal to 0·82 per 1,000 of population.

(*o*) *Pesháwar District.*—Nine temporary vaccinators—four paid from Municipal and five from Local Funds—were entertained during the cold season only, at an aggregate cost of Rs. 434, being a little over Rs. 8 a month for each man. This is the only district in the Province in which the whole of the vaccine establishment is discharged at the end of each vaccinating season ; a most objectionable plan, and one which, as has frequently been pointed out, owing to the inferior type of men who take service under such conditions, can only be the means of propagating imperfect or useless vaccination among the people, and of strengthening the prejudices against the operation, which genuine work alone can remove. The total number vaccinated was 4,391, against 3,313 of the previous year ; and the ratio of success in primary operations was 89·55, and excluding unknown 89·77 per cent. Comparing the returns of the town of Pesháwar with those of the rural circles, it is seen that while the ratio of success in primary cases, excluding unknown, shown by the former, is 85·02 per cent., that returned by the vaccinators working under little or no supervision in the villages exceed this by 6·58 per cent. Of the total number operated on, the results in 4,380 cases are reported to have been noted by the vaccinators, only 11 having escaped inspection. Thákar Dás, the Assistant Surgeon in charge of the Pesháwar dispensary, reports that " efforts were made to keep up vaccination during the summer months, but after the middle of May the operations began to fail, and, therefore, had to be stopped." From Mardán, Dr. Cones returns a total of 1,568 vaccinations, with 76·04 per cent. of primary operations successful, or, excluding unknown cases, 78·14. It is stated that 241 cases were those of children and adults coming from Swat, Baneyr and Bajour across the border. The total number of deaths referred to small-pox in this district during the year 1880 was 446, equivalent to a ratio of 0·89 per 1,000 of population.

(*p*) *Hazára District.*—Three vaccinators—two paid from Provincial Funds and one from Local sources—were employed, performing a total of 3,806 operations against 2,464 of the previous year, the ratio of success in primary cases being 93·92 per cent., and excluding unknown 97·19. But Dr. Power, the Civil Surgeon, in his report observes: " As the work has not been inspected by the Civil Surgeon, or by any Civil Officer during the year, the accuracy of the returns cannot be vouched for. " In addition to the work done every year by the Dispensary vaccinators, this district is overtaken every second year by the vaccinators of the Special Establishment. The number of deaths referred to small-pox in 1880 was only 4.

(*q*) *Jhelum District.*—One vaccinator paid from Provincial Funds was employed, vaccinating 765 persons, with 92·27 per cent. successful, and excluding unknown 94·37. Operations were confined to the town of Jhelum and the adjacent villages.

(*r*) *Hissar District.*—Two vaccinators paid from Provincial Funds are reported to have been employed in the towns of Hissar, Hánsi, Fatehabad and Barwála, and to have vaccinated 1,835 persons, of which 77·11 per cent. are returned as successful, or 89·27 when the unknown cases are not taken into account. There were 25 deaths registered from small-pox in 1880, being at the rate of 0·05 per 1,000 of population.

(*s*) *Sirsa District.*—Four vaccinators paid from Provincial Funds worked in the three tahsíls of this district, and performed a total of 8,233 operations, against 5,066 of the previous year. Of these, in primary vaccinations 88·49 per cent. including unknown, and, excluding these, 93·20, are returned as having been successful. Sodí Fateh Singh, the Civil Surgeon, reports that of 1,681 vaccinations inspected by him in 66 villages and 4 Municipal towns, 1,571 were seen to be successful, or 93·45 per cent. "The residents of Fázilka," he says, "are very much opposed to vaccination, the Members of the Municipal Committee not only do not give any assistance to the vaccinators, but, on the contrary, are ready to quarrel with them when asked to help." A serious outbreak of small-pox occurred in this town towards the end of February, from which time to the end of March 130 cases and 27 deaths were recorded. On intimation of the occurrence of the epidemic, a Native Superintendent with a small party of vaccinators of the Special Establishment was despatched about the middle of March to carry on operations in the town and neighbouring villages, with instructions, at the same time, to hem in the disease as much as possible so as to prevent its further spread, by establishing a zone of vaccination round the infected area. This plan of operations was accomplished with fairly successful results, when the outbreak, which at one time had assumed considerable dimensions, appears to have gradually subsided. In 1880 the number of deaths from small-pox recorded was 24, being in the ratio of 0·11 per 1,000 living.

(*t*) *Shahpur District.*—Three permanent vaccinators,—two paid from Provincial and one from Local Funds,—were employed, performing a total of 1,873 operations. Of 1,356 primary operations performed by the vaccinators first alluded to, 27 were unsuccessful, and none escaped inspection; while of 517 primary cases returned by the last mentioned vaccinator not a single failure is recorded. As had to be pointed out in the report for the previous year, the returns received from this district are not to be considered trustworthy.

(*u*) *Baháwalpur State.*—The total number vaccinated by the four vaccinators employed by this State was 5,232 against 4,120 of the previous year; and the percentage of success in primary operations was 81·97, and excluding unknown 83·74.

(*v*) *Patiála State.*—An establishment of three Native Superintendents and 14 vaccinators, organized on the lines of the Punjab Establishment, worked in two districts of the State, comprising four tahsíls with a population of 695,451 according to this year's Census. The returns submitted by the vaccinators show a total of 30,947 vaccinations with a percentage of 97·13 successful in primary cases, and a ratio of 43·15 per 1,000 of population successfully vaccinated. The operations which came under the cognizance of Dr. Skeen, the Medical Officer of the State, is reported by him to have been well done, but he cannot vouch for the quality of the work performed in the rural circles, nor be responsible for the trustworthiness of the returns. All the vaccinations (17 in number) examined by me in the town of Patiála were successful. Though there is still a great deal to be done, vaccination has during the past year shown very considerable progress in this State, and now that the working of the department has been put into the hands of an European Medical Officer, there is every hope of its being established on a more solid basis than has heretofore been the case. The returns not having been submitted until too late for insertion, are not shown in Statement No. III, appended at the end of this report.

(*w*) *Kapurthala State.*—No vaccination returns have been received, but Dr. Warburton, the Medical Officer of the State, reports the following particulars of the year's work:—Of a total of 6,937 children vaccinated, 6,800 were done in Dr. Warburton's presence, and many of them with his own hand; the results in all the cases were inspected by the vaccinators, the ratio of success being 99·17 per cent., while the ratio of success per 1,000 of population is reported to be 27·69. The attitude of the people here continues favorable: "In every instance that I questioned the people," writes Dr. Warburton, "I was told that every one was now convinced that vaccination was an efficient protection against small-pox, and that they were much pleased with the operation. They, however, look upon the Native vaccinators with suspicion." This State was systematically gone over by the vaccinators of the Punjab Establishment in 1874-75, when a total of 23,816 persons were vaccinated, and again in 1876-77 with a total of 6,489. "I followed close on their steps," remarks Dr. Warburton, "and although cases of small-pox were said to have occurred among children vaccinated by them, and some of them were shown to me, I could discover no small-pox marks." "Cases of measles," he continues, "are often called small-pox even by Hakíms, who ought to know better, and deaths from this disease have been reported as small-pox. This occurred during an epidemic of measles here two years ago, when I was fortunately able to satisfy myself as to the true nature of the disease, many of the cases occurring in the town of Kapurthala itself."

21. Great assistance was received from the under-mentioned Chiefs and Native Officials, and I would beg to bring their names to the favorable notice of Government:—

His Highness the Rájah of Mandi.
His Highness the Rájah of Biláspur.
Hardial Singh, Superintendent of Suket.
Rashk Bihári Lál, Tahsíldár, Raya in Siálkot.
Iláhi Bakhsh, Tahsíldár, Zafarwál in Siálkot.
Muhammad Ikrám, Tahsíldár, Pasrúr in Siálkot.
Dalíp Singh, Tahsíldár, Kulu in Kángra.
Gopal Dás, Tahsíldár, Dera in Kángra.
Lachmi Sahaí, Tahsíldár, Hamírpur in Kángra.
Kanhya Lál, Tahsíldár, Tarn Táran in Amritsar.
Murad Ali, Tahsíldár, Chiniot in Jhang.
Brij Náth, Tahsíldár, Muzaffargarh.
Dwárka Náth, Tahsíldár, Hánsi in Hissar.

I have the honor to be,
Sir,
Your most obedient Servant,
JOHN BENNETT, M.D.,
Deputy Sanitary Commissioner, and Acting
Supdt. General of Vaccination, Punjab.

STATEMENTS.

Statement No. 1 *showing particulars of vaccination*

1	2	3	4	5	6	7			8
Number.	Name of District.	Circles and Districts.	Population of district according to census of 1868.	Average population per square mile.	Average number of vaccinators employed throughout the season.	TOTAL NUMBER OF PERSONS VACCINATED.			Average number of persons vaccinated by each vaccinator.
						Male.	Female.	Total.	
1	DELHI.	Tahsíl Delhi	315,286	...	...	1,825	1,700	3,525	...
		Do. Sonepat ...	167,897	...	...	2,494	2,280	4,774	...
		Do. Ballabgarh ...	125,667	...	...	232	284	516	...
		Total of District ...	608,850	496	4	4,551	4,264	8,815	2.203·75
2	GURGAON.	Tahsíl Gurgaon ...	123,485	...	...	1,809	1,586	3,395	...
		Do. Rewári ...	150,631	...	...	1,867	1,762	3,629	...
		Total of District ...	689,034	348	4	3,676	3,348	7,024	1,756
3	KARNAL.	Tahsíl Kaithal ...	192,820	...	...	1,483	1,622	3,105	...
		Total of District ...	617,372	264	4	1,483	1,622	3,105	776·25
4	HISSAR.	Tahsíl Hissar... ...	107.442	...	...	609	672	1,281	...
		Do. Bhiwáni ..	104.170	...	...	2,406	2,440	4,846	...
		Do. Hánsi	126,404	...	...	3,370	3,241	6,611	...
		Do. Barwála ...	66,199	...	...	1,195	1,111	2,306	...
		Total of District ...	484,681	137	4	7,580	7,464	15,044	3,761
5	ROHTAK.	Tahsíl Gohána ...	119,506	...	...	1,220	1,205	2,425	...
		Do. Sámpla ...	142,992	...	...	1,651	1,870	3,521	...
		Total of District ...	551,866	295	3	2,871	3,075	5,946	1,982
6	SIRSA.	Tahsíl Fázilka ...	66,970	...	...	72	82	154	...
		Total of District ...	210,795	68	4	72	82	154	38·5
7	UMBALLA.	Tahsíl Umballa ...	223,703	...	...	1,661	1,486	3,147	...
		Do. Pipli	221,419	...	...	1,548	1,545	3,093	...
		Total of District ...	1,055,485	394	4	3,209	3,031	6,240	1,560
8	LUDHIANA.	Tahsíl Ludhiána ...	290.148	...	...	2,658	2,426	5,084	...
		Do. Samrála ...	143,458	...	...	1,712	1,414	3,126	...
		Total of District ...	573,245	429	4	4,370	3,840	8,210	2,052·5
9	SIMLA.	Sanitarium of Simla ...	17,440	...	...	150	100	250	...
		Total of District ...	33,594	1,888	4	150	100	250	62·5
10	JULLUNDUR.	Tahsíl Jullundur ...	260,885	...	...	2.477	2,180	4,657	...
		Do. Nawashahr ...	181.914	...	...	2,295	2,052	4.347	...
		Do. Phillour ...	166.299	...	...	2,401	2,004	4,405	...
		Do. Nakodar ...	185,666	...	...	680	653	1,333	...
		Total of District ...	794,764	596	4	7,853	6,889	14,742	3,685·5

DEPARTMENT.

in the Punjab during the year 1880-81.

9	10	11	12	13	14	15	16	17	18	19	20	21
PRIMARY VACCINATION.				RE-VACCINATION.		PERCENTAGE OF SUCCESSFUL CASES.		Persons successfully vaccinated per 1,000 of population.	*Average annual number of persons successfully vaccinated during previous five years.*		*Average annual number of deaths from small-pox during previous five years.*	
	Successful.											
Total.	Under 1 year.	Over 1 and under 6 years.	Total of all ages.	Total.	Successful.	Primary.	Re-vaccination.		No.	Ratio per 1,000	No.	Ratio per 1,000.
3,488	2.736	637	3,374	37	21	...	...	...	...	...	...	...
4,763	2.821	1,756	4,577	11	4	...	...	...	...	...	...	...
516	447	55	502	...	...	...	...	...	...	...	...	...
8,767	6,004	2.448	8,453	48	25	96·41	52·08	13·92	8,983·4	14·75	375·6	0·61
3,354	1,652	1.519	3,171	41	...	..	...	...	...	...	...	...
3,600	1,778	1,705	3,483	29	...	...	...	...	...	...	...	...
6,954	3,430	3,224	6,654	70	...	95 68	00 00	9·65	6,327·4	9·18	2,540·6	3·68
3,105	1,636	1,005	2,641	...	...	...	...	...	...	...	...	...
3,105	1,636	1,005	2,641	...	...	85·05	...	4·27	10,973	17·77	1,824·6	2·95
1,281	542	705	1,247	...	...	...	...	...	...	...	...	...
4,796	2.517	2,161	4,678	50	24	...	...	...	...	...	...	...
6,597	3,956	2,514	6.470	14	6	...	...	...	...	...	...	...
2,302	1,368	872	2,240	4	2	...	...	...	...	...	...	...
14,976	8,383	6,252	14,635	68	32	97·72	47·05	30·26	10,836·6	22·35	457·2	0·94
2,425	1,273	1,088	2,361	...	...	...	...	...	...	...	...	...
3,521	1,943	1,440	3,383	...	...	...	...	...	...	...	...	...
5,946	3,216	2,528	5,744	...	...	96·60	...	10·40	8,004·2	14·50	437·2	0·79
140	77	27	104	14	1	...	...	...	...	...	...	...
140	77	27	104	14	1	74·28	7·14	0·49	5,476·4	25·97	366·4	1·73
3,129	1,781	1,240	3,021	18	3	...	...	...	...	...	...	...
3,071	1,565	1,337	2,902	22	6	...	...	...	...	...	...	...
6,200	3,346	2,577	5,923	40	9	95·53	22·50	5·62	12,277·8	11·63	2,060·8	1·95
5,077	4,234	713	4,947	7	...	...	...	...	...	...	...	...
3,116	2,654	376	3,030	10	9	...	...	...	...	...	...	...
8,193	6,888	1,089	7,977	17	9	97·36	52·94	13·93	11,108·6	19·37	990·8	1·72
250	80	117	240	...	...	...	...	...	...	...	...	...
250	80	117	240	...	...	96·00	...	7·14	1,616·4	48·11	11·4	0·33
4,657	3,762	737	4,499	...	...	...	...	...	...	...	...	...
4,347	3.194	962	4,156	...	...	...	...	...	...	...	...	...
4.377	3,757	475	4,232	28	19	...	...	...	...	...	...	...
1,333	805	508	1,313	...	...	...	...	...	...	..	...	...
14,714	11,518	2,682	14,200	28	19	96·50	67·85	17·89	15,155·4	19·06	255·2	0·32

A—VACCINE

1	2	3	4	5	6	7			8
Number.	Name of District.	Circles and Districts.	Population of district according to census of 1868.	Average population per square mile.	Average number of vaccinators employed throughout the season.	TOTAL NUMBER OF PERSONS VACCINATED.			Average number of persons vaccinated by each vaccinator.
						Male.	Female.	Total.	
11	HOSHIARPUR	Tahsíl Hoshiárpur ...	250,036	...	...	3,194	2.656	5,850	...
		Do. Una	212,016	...	...	1,906	1,763	3.669	...
		Do. Dasuya ...	253.807	...	...	2,490	2,045	4,535	...
		Do. Garhshankar ...	223,031	...	...	5,747	4,930	10,677	...
		Total of District ...	938,890	450	23	13,337	11,394	24,731	1,075·26
12	KANGRA.	Tahsíl Kángra ...	210,223	...	...	4.001	4,157	8,158	...
		Do. Kulu	98,923	...	...	5.079	4,677	9,756	...
		Do. Dera	126,350	...	...	4,774	5.251	10,025	...
		Do. Hamirpur ...	179,961	...	...	2,168	2,024	4,192	...
		Total of District ...	740,237	87	18	16,022	16,109	32,131	1,785·05
13	AMRITSAR.	Tahsíl Amritsar ...	280,289	...	...	2.046	1,683	3,729	...
		Do. Tarn Táran ...	241,150	...	...	1,729	1,452	3.181	...
		Do. Ajnála ...	209,540	...	...	4,113	3,713	7,826	...
		Total of District ...	730,979	535	34	7,888	6,848	14,736	433·41
14	GURDASPUR.	Tahsíl Gurdáspur ...	247,297	...	...	3,943	3.565	7.508	...
		Do. Shakargarh ...	245,362	...	...	3.970	3,708	7,678	...
		Do. Batála ...	250,764	...	...	4,453	3,742	8,195	...
		Do. Pathánkot ...	163,350	...	...	1,536	1,426	2,962	...
		Total of District ...	906,773	496	21	13,902	12,441	26,343	1,254·42
15	SIALKOT.	Tahsíl Siálkot ...	380,031	...	...	7,973	7,144	15.117	...
		Do. Pasrúr ...	244,997	...	...	5 476	4,840	10,316	...
		Do. Zafarwál ...	180,228	...	...	5,170	4,595	9,765	...
		Do. Raya ...	199,748	...	...	5,167	4,832	9,999	...
		Total of District ...	1,005,004	510	29	23,786	21,411	45,197	1,558·51
16	LAHORE.	Tahsíl Lahore ...	306,832	...	...	385	357	742	...
		Do. Chunian ...	167,457	...	...	3,624	3,235	6,859	...
		Do. Kasur ...	197,667	...	...	3 162	2,562	5,724	...
		Do. Sharakpur ...	117,710	...	...	2,192	2,060	4,252	...
		Total of District ...	789,666	218	4	9.363	8,214	17,577	4,394·25
17	FEROZE-PORE.	Tahsíl Ferozepore ...	131,500	...	...	604	591	1,195	...
		Do. Muktsar ...	94.837	...	...	2,253	1,982	4,235	...
		Do. Zira ...	139,693	...	...	1,722	1,679	3,401	...
		Total of District ..	549,253	204	4	4,579	4,252	8,831	2,207·75
18	GUJRANWALA.	Tahsíl Gujránwála ...	222,559	...	...	4.614	3.842	8,456	...
		Do. Wazirabad ...	151,041	...	...	2,884	2,736	5,620	...
		Do. Háfizabad ...	176,986	...	...	3,178	2,969	6,147	...
		Total of District ..	550,586	207	32	10,676	9,547	20,223	631·96

DEPARTMENT—*continued.*

9	10	11	12	13	14	15	16	17	18	19	20	21
PRIMARY VACCINATION.				RE-VACCINATION.		PERCENTAGE OF SUCCESSFUL CASES.		Persons successfully vaccinated per 1,000 of population.	*Average annual number of persons successfully vaccinated during previous five years.*		*Average annual number of deaths from small-pox during previous five years.*	
	Successful.											
Total.	Under 1 year.	Over 1 and under 6 years.	Total of all ages.	Total.	Successful.	Primary.	Re-vaccination.		No.	Ratio per 1,000	No.	Ratio per 1,000.
5,827	4,321	1,047	5,410	23	4	...	...	...	...	...	...	...
3,621	2,523	914	3.439	48	15	...	...	...	...	...	...	...
4,526	3,569	643	4.221	9	5	...	...	...	...	...	...	...
7,099	5,933	937	6,870	3,578	1,639	...	...	...	...	...	...	...
21,073	16,346	3,541	19,940	3,658	1,663	94·62	45·46	23·00	21,709·8	23·12	525·6	0·55
7,155	3,271	2,974	6.855	1,003	633	...	...	...	...	...	...	...
6,860	1,419	3,996	6.603	2,896	675	...	...	...	...	...	...	...
6,779	2,561	3,925	6,486	3,246	2,826	...	...	...	...	...	...	...
4,098	2,118	1,723	4,011	94	42	...	...	...	...	...	...	...
24,892	9,369	12.618	23,955	7,239	4,176	96·23	57·68	38·00	20,820·8	28·12	118·6	0·16
3,729	2,836	768	3,606	...	...	...	...	...	...	...	...	...
3,176	2.123	806	2,931	5	2	...	...	...	...	...	...	...
7,817	5,519	1,720	7,248	9	3	...	...	...	...	...	...	...
14,722	10,478	3,294	13,785	14	5	93·63	35·71	18·86	11,462·6	15·68	1,818	2·48
7,434	4,332	2,726	7,059	74	21	...	...	...	...	...	...	...
7,660	5,922	1,317	7,253	18	1	...	...	...	...	...	...	...
8,148	5,579	1,938	7,628	47	19	...	...	...	...	...	...	...
2,951	2,135	681	2,816	11	9	...	...	...	...	...	...	...
26,193	17,968	6,662	24,756	150	50	94·51	33·33	27·35	11,538·2	12·72	884·2	0·97
15,070	12.093	2,448	14.542	47	10	...	...	...	...	...	...	...
10,310	7,402	2,674	10,076	6	2	...	...	...	...	...	...	...
9,733	5,106	4,016	9,128	32	2	...	...	...	...	...	...	...
9,988	5,541	4,248	9,798	11	3	...	...	...	...	...	...	...
45,101	30,142	13,386	43,544	96	17	96·54	17·70	43·34	19,593·6	19·49	848	0·84
742	531	179	710	...	...	...	...	...	...	...	...	...
6,852	5,341	1,323	6,665	7	...	...	...	...	...	...	...	...
5,718	3,962	1,536	5,498	6	...	...	...	...	...	...	...	...
4,247	3,345	759	4,106	5	...	...	...	...	...	...	...	...
17,559	13,179	3,797	16,979	18	...	96·69	0·00	21·50	13,571·6	17·18	1,862·4	2·35
1,195	986	196	1,182	...	...	...	...	...	...	...	...	...
4,233	3,247	857	4,104	2	2	...	...	...	...	...	...	...
3,401	2,454	882	3,336	...	...	...	...	...	...	...	...	...
8,829	6,687	1,935	8,622	2	2	97·65	100	15·70	13,004·8	23·67	800·8	1·45
8,439	6,370	1,577	7,947	17	5	...	...	...	...	...	...	...
5,596	4,500	854	5,354	24	8	...	...	...	...	...	...	...
6,147	4,994	816	5,810	...	...	...	...	...	...	...	...	...
20,182	15,864	3,247	19,111	41	13	94·69	31·70	34·73	13,353·2	24·25	780·8	1·41

1	2	3	4	5	6	7			8
Number.	Name of District.	Circles and Districts.	Population of district according to census of 1868.	Average population per square mile.	Average number of vaccinators employed throughout the season.	Total number of persons vaccinated.			Average number of persons vaccinated by each vaccinator.
						Male.	Female.	Total.	
19	RAWALPINDI.	Tahsíl Rawalpindi ...	178,776	...	...	2,763	2,494	5,257	...
		Do. Attock ...	109,774	...	...	2,186	1,876	4,062	...
		Do. Murree ...	32,647	...	...	244	171	415	...
		Do. Gujar Khan ...	126,126	...	...	1,554	1,405	2,959	...
		Do. Pindigheb ...	86,869	...	...	1,791	1,751	3,542	...
		Do. Fátahjang ...	94,716	...	...	1,671	1,254	2,925	...
		Total of District ...	711,256	114	24	10,209	8,951	19,160	798·33
20	JHELUM.	Tahsíl Jhelum ...	150,472	...	...	729	561	1,290	...
		Do. Pind Dádan Khan	151,096	...	...	945	850	1,795	...
		Total of District ...	522,840	128	27	1,674	1,411	3,085	114·25
21	GUJRAT.	Tahsíl Gujrat ...	272,055	...	...	4,453	3,900	8,353	...
		Do. Phalian ...	154,287	...	...	3,045	2,932	5,977	...
		Total of District ...	616,347	324	4	7,498	6,832	14,330	3,582·5
22	SHAHPUR.	Tahsíl Shahpur ...	103,607	...	...	1,054	1,087	2,141	...
		Do. Bhera ...	139,727	...	...	1,573	1,483	3,056	...
		Do. Khushab ...	125,462	...	...	52	43	95	...
		Total of District ...	368,796	78	4	2,679	2,613	5,292	1,323
23	MOOLTAN.	Tahsíl Shujahabad ...	58,889	...	...	1,037	831	1,868	...
		Do. Lodhrán ...	90,111	...	...	670	615	1,285	...
		Do. Sarai Sidhu ...	65,734	...	...	1,995	1,855	3,850	...
		Total of District ...	471,563	80	20	3,702	3,301	7,003	350·15
24	JHANG.	Tahsíl Jhang ...	151,822	...	...	2,304	2,223	4,527	...
		Do. Chiniot ...	86,778	...	...	3,719	3,391	7,110	...
		Do. Shorkot ...	109,427	...	...	492	364	856	...
		Total of District ...	348,027	61	25	6,515	5,978	12,493	499·72
25	MONTGOMERY.	Tahsíl Montgomery ...	...	...	...	807	811	1,618	...
		Do. Pakpátan ...	...	...	...	1,777	1,575	3,352	...
		Do. Dipálpur ...	...	...	...	3,379	3,444	6,823	...
		Do. Gogera ...	...	...	...	2,640	2,625	5,265	...
		Total of District ...	359,437	64	18	8,603	8,455	17,058	947 66
26	MUZAFFAR-GARH.	Tahsíl Muzaffargarh ...	...	...	...	6,181	6,126	12,307	...
		Do. Sanawan ...	...	...	...	3,157	2,904	6,061	...
		Do. Alípur ...	...	...	...	2,542	2,393	4,935	...
		Total of District ...	259,547	98	20	11,880	11,423	23,303	1,165·15
27	HAZARA.	Tahsíl Abbott-abad ...	118,146	...	...	203	166	369	...
		Total of District ...	343,929	122	4	203	166	369	92.25
		TOTAL OF PROVINCE ...	15,832,816	...	138	188,331	173,061	361,392	2,618·78

DEPARTMENT—*continued.*

9	10	11	12	13	14	15	16	17	18	19	20	21
PRIMARY VACCINATION.				RE-VACCINATION.		PERCENTAGE OF SUCCESSFUL CASES.		Persons successfully vaccinated per 1,000 of population.	*Average annual number of persons successfully vaccinated during previous five years.*		*Average annual number of deaths from small-pox during previous five years.*	
	Successful.											
Total.	Under 1 year.	Over 1 and under 6 years.	Total of all ages.	Total.	Successful.	Primary.	Re-vaccination.		Number.	Ratio per 1,000.	Number.	Ratio per 1,000.
5,199	3,231	1,601	4,833	58	18	...	...	...	...	...	...	...
4,010	2,344	1,448	3,793	52	15	...	...	...	...	...	...	...
415	332	57	389	...	...	...	...	...	...	...	...	...
2,959	2,308	450	2,758	...	...	...	...	...	...	...	...	...
3,522	2,412	877	3,289	20	6	...	...	...	...	...	...	...
2,925	2,150	638	2,789	...	...	...	...	...	...	...	...	...
19,030	12,777	5,071	17,851	130	39	93·80	30·00	25·15	17,001·4	23·90	878·8	1·23
1,290	868	319	1,187	...	...	...	...	...	...	...	...	...
1,790	1,699	28	1,727	5	1	...	...	...	...	...	...	...
3,080	2,567	347	2,914	5	1	94·61	20·00	5·57	12,534·4	23·97	535·2	1·02
8,345	6,798	658	7,456	8	1	...	...	...	...	...	...	...
5,973	4,302	910	5,212	4	3	...	...	...	...	...	...	...
14,318	11,100	1,568	12,668	12	4	88·47	33·33	20·55	12,354	20·04	1,059·4	1·71
2,137	1,746	265	2,011	4	...	...	...	...	...	...	...	...
3,056	2,707	227	2,934	...	...	...	...	...	...	...	...	...
95	91	4	95	...	...	...	...	...	...	...	...	...
5,288	4,544	496	5,040	4	...	95·31	0·00	13·66	7,556	20·48	544·8	1·47
1,865	907	875	1,794	3	...	...	...	...	...	...	...	...
1,285	536	633	1,169	...	...	...	...	...	...	...	...	...
3,848	1,937	1,738	3,675	2	2	...	...	...	...	...	...	...
6,998	3,380	3,246	6,638	5	2	94·85	40	14·08	7,363·8	15·61	596	1·26
4.443	2.163	2,081	4,244	84	31	...	...	...	...	...	...	...
6,910	3,585	3,000	6,608	200	94	...	...	...	...	...	...	...
840	489	285	774	16	11	...	...	...	...	...	...	...
12,193	6,237	5,366	11,626	300	136	95·34	45·33	33·79	4,871·6	13·99	469·6	1·34
1,615	1,004	512	1 516	3	3	...	...	...	...	...	...	...
3,337	1,869	1,354	3,277	15	...	...	...	...	...	...	...	...
6,780	4,270	2,289	6,559	43	3	...	...	...	...	...	...	...
5,258	2,557	2,542	5.102	7	2	...	...	...	...	...	...	...
16,990	9,700	6,697	16,454	68	8	96·84	11·76	45·79	3,252·8	9·04	1,083·2	3·01
11,918	4,403	6,974	11,450	389	112	...	...	...	...	...	...	...
6,005	1,908	3,742	5,786	56	20	...	...	...	...	...	...	...
4,861	1,974	2,622	4,596	74	33	...	...	...	...	...	...	...
22,784	8,285	13,338	21,832	519	165	95·82	31·79	84·75	...	...	460·8	1·77
366	261	93	354	3	...	...	...	...	...	...	...	...
366	261	93	354	3	...	96·72	0·00	1·02	2,843·6	8·26	383·8	1·11
348,843	223,462	106,651	332,640	12,549	6,376	95·35	50·80	21·41	283,591·4	18·21	22,969·8	1·45

A.—VACCINE

Statement No. 1—*showing particulars*

1	2	3	4	5	6	7			8	9
Number.	Name of District.	Circles and Districts.	Population of district according to census of 1868.	Average population per square mile.	Average number of vaccinators employed throughout the season.	*Total number of persons vaccinated.*			Average number of persons vaccinated by each vaccinator.	PRIMARY
						Male.	Female.	Total.		Total.
1		Native State Mandi ...	...	...	13	4,251	3,808	8,059	619·92	7,902
2		Do. Suket ...	...	...	5	4,094	3,117	7,211	1,442·2	7,141
3		Do. Lambagraon	...	...	5	619	543	1,162	232·4	1,145
4		Do. Kutlehar	...	...	3	210	174	384	128·00	378
5		Do. Nadaun ...	...	...	4	303	283	586	146·50	575
6		Do. Dada Siba	...	...	2	655	863	1,518	759·00	1,388
7		Do. Chamba ...	...	...	14	3,357	2,940	6,297	449·78	5,265
8		Do. Biláspur...	...	...	14	1,834	1,597	3,431	245·07	3,410
9		Do. Arki ...	...	...	6	758	745	1,503	250·50	1,503
10		Do. Bhajji ...	...	...	7	490	436	926	132·28	913
11		Do. Theog ...	...	...	4	309	192	501	125·25	389
12		Do. Mangal ...	...	...	2	23	10	33	16·05	32
13		Do. Madhan ...	...	...	3	207	79	286	95·33	220
14		Do. Kunhiar...	...	...	4	73	40	113	28·25	113
15		Do. Kumarsain	...	...	3	229	259	488	162·66	483
16		Do. Keonthal	...	...	3	218	187	405	135·00	366
17		Do. Pataudi ...	...	...	1	41	27	68	68·00	67
18		Do. Jamu and Kashmir.	...	...	1	6	7	13	13·00	13
		Total Native State	..	...	...	17,677	15,307	32,984	...	31,303
		Grand Total ...	...	...	138	206,008	188,368	394,376	2,857·79	380,146

DEPARTMENT.—(concluded).

of Vaccination in the Punjab during the year 1880-81.

10	11	12	13	14	15	16	17	18	19	20	21
VACCINATION.			*Re-vaccination.*		*Percentage of successful cases.*		Persons successfully vaccinated per 1,000 of population.	*Average number of persons successfully vaccinated during previous five years.*		*Average annual number of deaths from small-pox during previous 5 years*	
Successful.											
Under one year.	Over one and under six years.	Total of all ages.	Total.	Successful.	Primary.	Re-vaccination.		Number.	Ratio per 1,000.	Number.	Ratio per 1,000.
1,398	5,694	7,579	157	70	95·91	44·58	...	4,636·2	...	...	...
1,549	5,368	6,960	70	24	97·46	34·28	...	645·4	...	...	...
485	495	994	17	6	86·81	35·29	...	751·2	...	...	...
141	185	367	6	3	97·09	50·00	...	68·6	...	...	...
172	384	561	11	5	97·56	45·45	...	729·6	...	...	...
449	884	1,333	130	70	96·03	53·84	...	320·8	...	...	...
2,295	2,159	4,958	1,032	526	94·16	50 96	...	2,430·8	...	...	...
1,070	1,762	3,282	21	8	96·24	38·09	...	2,075·0	...	...	...
159	856	1,359	...	...	90·41	...	...	282·2	...	...	...
117	665	870	13	6	95·29	46·15	...	185·4	...	...	...
29	145	366	112	23	94·08	20·53	...	92·8	...	...	...
20	11	32	1	...	100	...	...	36·0	...	...	...
2	61	206	66	13	93·63	19·69	...	...	...	...	...
5	68	103	...	...	91·15	...	...	...	...	...	...
46	321	447	5	...	92·54	...	...	288·4	...	...	...
15	190	343	39	14	93·71	35·89	...	494·0	...	...	...
36	27	63	1	...	94·02	...	...	168·0	...	...	...
4	9	13	...	...	100	...	...	4,820·8	...	...	...
7,992	19,284	29,836	1,681	768	95·31	45·68	...	18,025·2	...	...	...
231,454	125,935	362,476	14,230	7,144	95·35	50·20	...	301,616·6	...	...	...

A.—VACCINE DEPARTMENT.

Statement No. II showing the Cost of the Department in the Punjab during the year 1880-81.

Number.	Circles and Districts.	Establishment.							Expenditure.				Paid from						Number of all successful vaccinations and re-vaccinations.	Average cost of each successful case.
						Vaccinators.														
		Superintendent General.	Superintendents of Circles.	Deputy Superintendents of Circles.	Native Superintendents.	1st Class.	2nd and 3rd Class.	Chaprasis and other Servants.	Pay of Establishment.	Travelling allowance.	Contingencies.	Total Cost.	Imperial Funds.	Provincial Funds.	Local Funds.	Municipalities.	Native States.	Total.		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
									Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.		Rs. A. P.
	Punjab ...	1	2	1	33	23	115	10	49,358 0 0	3,874 12 2	1,311 2 8	54,543 14 10	...	54,451 10 7	40 5 3	51 15 0	...	54,543 14 10	369,620	0 2 4·33
	Total ...	1	2	1	33	23	115	10	49,358 0 0	3,874 12 2	1,311 2 8	54,543 14 10	...	54,451 10 7	40 5 3	51 15 0	...	54,543 14 10	369,620	0 2 4·33

Note.—(*a*). The Province is not divided into Circles; and in several Districts there are no fixed Vaccine Establishments.
(*b*). The figures given in the above Statement as to the aggregate cost, and the cost of each successful case, correspond with those given in para. 7 of the Report.

B.—DISPENSARY VACCINATION.

Statement No. III showing Dispensary Vaccination in the Punjab during the year 1880-81.

1	2	3	4	5	6	7	8	9	10	11	12	13
Districts.	Number of dispensaries in each district to which a vaccinator is attached.	Average number of vaccinators attached to dispensaries during the season.	Total number of persons vaccinated.	Average number of persons vaccinated by each vaccinator.	Primary Vaccination.				Re-vaccination.		Percentage of successful cases	
						Successful.						
					Total.	Under one year.	One and under six.	Total of all ages.	Total.	Successful.	Primary.	Re-vaccination.
Delhi	2	9	5,024	558·22	4,971	1,952	2,360	4,312	53	32	86·74	60·37
Karnál	6	4	1,275	318·75	1,262	865	284	1,149	13	9	91·04	69·23
Hissar	1	2	1,835	917·50	1,835	947	468	1,415	...	...	77·11	...
Sirsa	2	4	8,233	2,058·25	8,048	5,221	1,901	7,122	185	134	88·49	72·43
Umballa	6	8	5,813	726·62	5,362	3,701	1,010	4,711	451	347	87·85	76·94
Ludhiána	2	3	1,611	537·00	1,611	1,272	280	1,561	...	...	96·89	...
Amritsar	1	4	3,019	754·75	2,935	1,890	924	2,814	84	47	95·87	55·95
Siálkot	1	1	485	485·00	480	451	23	474	5	5	98·75	100
Lahore	3	12	4,378	364·83	4,342	2,993	910	3,903	36	16	89·88	44·44
Ferozepore	1	2	1,600	800·00	1,600	1,266	253	1,519	...	...	94·93	...
Jhelum	1	1	765	765·00	673	507	114	621	92	53	92·27	57·60
Shahpur	6	3	1,873	624·33	1,873	1,702	143	1,845	...	...	98·50	...
Mooltan	1	2	1,424	712·00	1,421	921	452	1,379	3	3	97·04	100
Jhang	8	13	8,157	627·46	8,074	5,190	2,610	7,800	83	35	96·97	42·16
Montgomery ...	5	2	2,033	1,016·50	2,014	947	1,007	1,954	19	16	97·02	84·21
Muzaffargarh ...	4	5	2,532	506·40	2,498	877	1,203	2,141	34	28	85·70	82·35
Dera Ismail Khan ...	5	8	6,710	838·75	6,648	2,931	2,299	5,814	62	33	87·45	53·22
Dera Gházi Khan ...	3	5	5,919	1,183·80	5,877	1,997	2,994	4,991	42	31	84·92	73·80
Bannu	3	4	6,023	1,505·75	5,436	1,955	2,504	4,468	587	418	82·19	71·20
Peshâwar	7	11	5,959	541·72	5,649	2,538	2,181	4,888	310	164	86·52	52·90
Hazára	2	3	3,806	1,268·66	3,804	3,175	398	3,573	2	2	93·92	100
Kohát	1	2	1,996	998·00	1,996	1,554	262	1,796	...	...	89·97	...
Bahâwalpur State ...	4	4	5,232	1,308·00	4,850	2,639	1,337	3,976	382	322	81·97	84·29
Total ...	75	112	85,702	765·19	83,259	47,491	25,947	74,256	2,443	1,695	89·18	69·38
Umballa Cantonments.	1	1	1,400	1,400	1,356	711	481	1,274	44	28	93·95	63·63
Subáthu Do. ...	1	1	481	481	422	232	148	380	59	52	90·04	88·13
Mecan Meer Do. ...	1	1	712	712	615	271	308	579	97	74	94·14	76·28
Peshâwar Do. ...	1	1	1,092	1,092	1,082	408	395	1,042	10	8	96·30	80·00
Total ...	4	4	3,685	921·25	3,475	1,622	1,335	3,275	210	162	94·24	77·14
Grand Total ...	79	116	89,387	770·57	86,734	49,113	27,282	77,531	2,653	1,857	89·38	69·99

Note.—In this statement are shown the vaccinations performed by the various Local Establishments, Municipal and Local Funds, &c., as well as those done by Dispensary vaccinators paid from Provincial Funds.

Comparative Statement No. IV showing the number of persons primarily vaccinated, and the number of those persons who were successfully vaccinated, in the Punjab in each of the undermentioned official years.

ESTABLISHMENTS.	PERSONS PRIMARILY VACCINATED. Years ended 31st March 1867.		1868.		1869		1870.		1871.		1872.		1873.		1874.	
	Total number.	Number successfully vaccinated.	Total number.	Number successfully vaccinated.	Total number.	Number successfully vaccinated.	Total number.	Number successfully vaccinated.	Total number.	Number successfully vaccinated.	Total number.	Number successfully vaccinated.	Total number.	Number successfully vaccinated.	Total number.	Number successfully vaccinated.
Government ...	134,820	126,402	168,970	159,704	180,368	169,537	103,632	97,868	138,325	131,228	193,137	183,050	278,953	264,957	340,228	323,392
Municipal ...	...	...	...	..	...	...	...	...	9,427	9,102	10,921	9,091	13,956	11,928	25,533	20,822
Local Funds ..	...	...	...	...	...	...	...	...	3,191	2,143	740	610	11,373	8,068	35,242	27,346
Native States ...	...	...	...	...	...	...	...	...	4,978	3,402	8,159	4,520	12,020	6,300	14,158	12,636
Dispensaries ...	61,746	42,345	64,892	44,177	73,597	48,970	43,898	30,188	59,569	45,932	53,095	42,275	49,422	36,565	43,160	32,668
Army ...	...	...	...	...	...	...	...	...	..	...	...	...	...	...	...	...
European ...	..	...	...	...	...	...	..	...	...	...	..	..	...	...	...	...
Native ...	...	...	...	...	..	..	...	...	..	...	..	..	...	...	...	...
Total ...	196,566	168,747	233,862	203,881	253,965	218,507	147,530	128,056	215,490	191,807	266,052	239,546	365,724	327,818	458,321	416,864

ESTABLISHMENTS.	1875.		1876.		1876.* See Note.		For three months ending 31st March 1877.†		1878.		1879.		1880.		1881.	
	Total number.	Number successfully vaccinated.	Total number.	Number successfully vaccinated.	Total number.	Number successfully vaccinated.	Total number.	Number successfully vaccinated.	Total number.	Number successfully vaccinated.	Total number.	Number successfully vaccinated.	Total number.	Number successfully vaccinated.	Total number.	Number successfully vaccinated.
Government ...	371,934	355,180	295,929	280,916	280,831	267,069	157,170	149,210	371,821	356,589	380,118	359,893	301,835	288,141	380,146	362,476
Municipal ...	29,147	24,852	20,695	17,046	21,710	18,271	16,095	13,782	32,643	27,777	26,323	23,417	12,727	11,044	21,841	19,544
Local Funds ..	45,968	35,903	43,057	34,304	46,413	36,908	25,217	21,353	37,204	30,842	15,585	13,802	13,621	12,245	15,883	14,216
Native States ...	7,255	7,207	16,637	15,084	3,439	2,564	6,125	4,631	5,335	4,036	4,859	3,687	3,656	3,050	4,850	3,976
Dispensaries ...	38,700	29,954	36,611	29,403	37,728	30,100	30,151	24,997	40,353	33,411	33,134	29,921	32,565	29,336	36,195	32,246
Army ...	...	...	...	...	...	...	...	...	...	...	...	..	...	...	...	...
European ...	..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Native ...	..	..	...	...	..	...	...	...	...	...	...	...	...	...	...	...
Total ...	493,004	453,096	412,929	376,753	390,121	354,912	234,758	213,973	487,356	452,655	460,019	430,720	364,404	343,816	458,915	432,458

NOTE.—* The time for submitting these returns having been changed in 1877-78, that for 1876 shows the numbers vaccinated during the year ending 31st December 1876.
† Three months intervening between the calendar year 1876 and the official year 1877-78.
Re-vaccinations are not included in this statement; nor are vaccinations performed by Hospital Assistants and Cantonment vaccinators.

SECTION VIII.

No Remarks.

SECTION IX.—SANITARY WORKS.—CIVIL.

The important water-supply and drainage works completed and in progress during the year.

97. The most important works comprised under this Section of the Report are the water-supply and drainage projects of Lahore, Simla, Amritsar, Delhi, Ludhiána, Kohát, and Hánsi in Hissar District. The water-supply projects of Lahore and Simla are in progress and now in a fair way towards completion. The drainage scheme for Amritsar is also fairly advanced towards completion. The remaining four projects are still under reference or about to be commenced; and the correspondence that has transpired from this office regarding those not yet commenced is given below in extenso.

DELHI WATER WORKS.

Delhi water works.

98. The following correspondence has transpired on the above subject:—

Copy of a letter No. 276, *dated* 21*st January* 1881, *from Superintending Engineer, 2nd Circle, Umballa, to the Sanitary Commissioner Punjab, Lahore.*

With reference to the accompanying copy of my No. 117, dated 8th January last, to the address of the Deputy Commissioner, Delhi, I have the honor to request the favor of an expression of your opinion as to the suitability or otherwise of the position for the site of the reservoir and wells for the Water Works at Delhi as proposed by me.

2. I enclose you a tracing showing the positions of the sites, and which to me seems, as far as I can judge, preferable in a sanitary point of view to the old or first proposed position.

3. I shall be happy to meet you at Delhi if you wish it, and should be glad to hear from you at an early date in this matter, as it is an important one, and the Municipality are losing money in the pay of establishment, which cannot be fully employed until this question is decided.

4. The site which I propose for reservoirs is on a plateau behind Hindoo Rao's House, and the site for the wells much higher up stream than formerly, and a little above Metcalf House, as indicated on the tracing.

Copy of a letter No. 117, *dated* 8*th January* 1881, *from the Superintending Engineer, 2nd Circle, Punjab, to the Deputy Commissioner and President Municipal Committee, Delhi.*

With reference to our recent interview and with a view to economy in carrying out the proposed scheme of the Water Works for Delhi, the best site for the service reservoir seems to be that known as Hindoo Rao's House, and that for the supply wells, some place above Metcalf House.

2. If the service reservoir is placed in this position, the length of the rising main will be reduced by some two miles from that formerly proposed by Mr. Devon, and this shortening of the rising main will represent in money a saving of something like two lakhs of rupees in the cost of iron work, a sum that would seem to warrant the alteration of the site for the reservoir, even when it is considered that a considerable sum has already been expended on Mr. Devon's scheme.

3. Besides the economy in thus shortening the rising main, there will be a very considerable saving in engine power and consequently in daily expenditure in working the engine, the exact amount of which will be determined hereafter.

4. I consider the site for the supply wells above Metcalf House is equally good and more inexpensive than that now proposed, which is far out in the bed of the river on the outer edge of the Bela plantation, and in so exposed a position that very costly protecting works would be absolutely necessary.

5. These points were laid before His Honor the Lieutenant Governor recently in your presence and received his provisional approval, but to enable me to finally decide the exact site most suitable for the supply wells, and in order that the water may be properly analysed, I should be glad if you will kindly authorize Mr. Morley to sink three small " kutcha-pucca " wells 4 feet in diameter near Metcalf House in such positions as I may point out to him.

6. These wells will be inexpensive and ought not to cost more than Rs. 150 each.

7. The sinking of such wells need not delay the preparation of the project, as there are other portions which can fully occupy the Engineer's time, but to prevent unnecessary delay I should be glad if the wells can be sunk within a month, if possible.

Copy of a letter No. 438, *dated* 7*th March* 1881, *from Sanitary Commissioner Punjab, to Secretary to Government Punjab.*

Government Punjab Home Dept. No. 3773 of 29th November 1880, to Sanitary Commissioner, Punjab, Superintending Engr. 2nd Circle, Punjab, No. 276 of 21st January 1881.

Sanitary Commr., Punjab, No. 282 of 31st January 1881, to Superintending Engr., 2nd Circle, Punjab.

Sanitary Commr., Punjab, No. 395 of 24th February 1881, to Supdg. Engineer, Punjab.

Supdg. Engineer 2nd Circle, Punjab No. 728 of 25th February 1881, to Sanitary Commr., Punjab.

Referring to the correspondence noted in the margin, copies of which are herewith enclosed, I have the honor to state, for the information of His Honor the Lieutenant Governor, that on the 4th instant, in company with Mr. Tyndall, the Superintending Engineer 2nd Circle, Punjab, I went over the ground and carefully examined the sites proposed by him for the reservoir and supply wells for the Water Works at Delhi.

It appears to me that the sites now proposed by Mr. Tyndall for the reservoir and wells are decidedly preferable to the positions previously proposed by Mr. Devon, both from an economical as well as from a sanitary point of view.

The position on the ridge near Hindoo Rao's House, whilst it possesses, as I am given to understand, all the engineering requirements of the old site on the Idgah ridge, has the great advantage of being situated on a more salubrious locality, and well separated from the crowded centres of population which surround the old site. At the same time its closer proximity to the supply wells will very considerably diminish the cost of the whole project. I observe that the site for the reservoir is in immediate juxtaposition to the existing Hospital for European Troops, but any objections which might present themselves on this score will be removed, as I understand from Mr. Tyndall that it is intended to transfer the Hospital to another site and retain the present building as quarters for the Water Works staff.

The position now proposed for the supply wells is situated close beyond Metcalf House and opposite the village of *Chandráwar*, upon a sandy tract which has been thrown up by the river. The site whilst equally good as the one previously proposed, as respects facility of supply from the sandy soil on the river bank, has the great advantage of being situate above stream in a position free of the risk of contamination from the drainage of the city and populous suburban quarters, which at present finds its way into the river bed in, and about, the position of the previously proposed site.

But at the same time, supposing that the analysis of the water proves quite satisfactory, the site now proposed is not, as it at present stands, free from very important objections in this particular respect of risk of contamination from surface drainage sinking into the soil and mingling with the subsoil water. The objections, however, are capable of removal, and this risk of contamination may be prevented by the adoption of proper precautionary measures.

As no other site so suitable, in respect to abundant, unfailing, and easy water supply, is available, except at so great a distance up stream as to increase the initial cost of the project to a prohibitory degree to the Municipality, I am in favor of accepting the site now proposed by Mr. Tyndall for the supply wells, provided it is rendered fit for the purpose intended by the execution of the requisite engineering works.

These works, so far as affects the sanitary requirements of the case, appear to me to be as follows: First, the removal of the village of Chandráwar; second, the removal of the population above the site of the supply wells; and third, the preservation and proper drainage of the waste land above and about the site of the supply wells.

With respect to the first of these measures, the village of Chandráwar consists of about 100 huts and a population of between 500 and 600 souls. The inhabitants, I understand, comprise a few brahmin families, together with cultivators and menial classes such as sweepers, swine keepers, &c. The village is situated on the old river bank immediately overlooking the sandy reach on which it is proposed to build the supply wells. I found the village in a very neglected and unsatisfactory sanitary condition, and there were some large collections of stable dung, litter and filth of sorts on the slope of the bank towards the river. The heavy rains at the time of my visit exemplified the manner in which these accumulations of filth would prove a source of contamination to the subsoil water from which the supply wells will be fed; for the surface drainage flowed from the village on to the sandy reach, and there sunk into its porous soil by infiltration towards the current of the river stream. As the supply wells are to be sunk in this sandy reach directly between the village and the river, it becomes necessary that this village be entirely removed, its site cleared of filth, and the surface soil purified by repeated ploughings and exposure to the air during a period of at least a year or two before the wells are drawn from. The removal of the village will, I understand, not be a matter of difficulty, as the fields of its cultivators will be taken up by the water works. The ploughing up of its site and exposure to the air may be effected during the year or two it will take to bring the water works to completion.

As regards the second measure,—the removal of the plantation. At the upper part of the sandy reach on which it is proposed to sink the supply wells, and at the point where it deflects the stream of the river from the original high bank, there is a Government plantation similar to, though of smaller extent than, those situated lower down the bank, and known as the *bela* plantation. This upper plantation is contiguous to, and continuous with, the cultivated fields which cover the intervening stretch of sandy reach and lie between Metcalf House and Chandráwar village on one side and the river stream on the other. These cultivated fields, opposite Metcalf House and the Chandráwar village, cover the site of the proposed supply wells. In its present condition the plantation above the village closely approaches the character of a marsh, and from its immediate proximity to the supply wells constitutes a very objectionable feature of the proposed site.

The only remedy I can see is in its entire demolition, the thorough clearance of the site, and the efficient drainage of the soil by deep trenches towards the current of the river. These measures should be carried out at the earliest possible date so as to give time to the soil to recover itself during the time occupied in the construction of the water works. I understand that some protective work of masonry will be required in connection with the supply wells to secure the sandy reach against disturbance from occasional river floods and the action of the stream in ordinary times. In this case, I think it would be, if practicable, very advisable on sanitary considerations that these protective works should be so arranged as to cut off the plantation site from the rest of the sandy reach, and to provide for the drainage of its soil by a separate channel direct into the current of the river. If this is neglected there will be the risk of contamination of the well water by infiltration through the loose sand.

In regard to the above-mentioned measures,—the preservation of the ground above and about the site of the supply wells. There is a considerable area of waste land about and on the river bank above the village of Chandráwar. The ground here is covered with the lines of old walls and decayed buildings and is furrowed by some considerable drainage gullies. I think that all this land, say from Metcalf House up to the Minaret beyond the Fakir's shrine on the river bank above Chandráwar, and back to the base of the ridge, should be taken up by the Municipality and preserved in connection with the water works. With the exception of the drainage gully of Chandráwar itself, which should be provided with an outlet emptying direct into the river stream, none of the drainage of the ground above and beyond the village should be allowed to approach the reach of the supply wells. This drainage can all be easily conducted direct into the current of the river above the plantation site.

If the measures above indicated are carried out in connection with the water works project, I am of opinion that the site proposed by Mr. Tyndall for the supply wells may be rendered fit for the purpose intended so far as concerns the sanitary aspect of the case, should analysis prove the water to be of suitable quality.* The site, so far as I am able to judge, is the only one available within the limits of the Municipality, provided the sanitary requirements and precaution above indicated are attended to. For it must be borne in mind that the site of the supply wells is a mere layer of loose sand which has been deposited by the river, and from its very porous nature requires more than ordinary measures for protection against surface impurities.

LUDHIANA DRAINAGE AND WATER-SUPPLY SCHEME.

Copy of a letter No. 399, *dated* 8*th October* 1880, *from the Commissioner and Superintendent, Umballa Division, to the Secretary to Government, Punjab.*

99.

Ludhiána drainage and water-supply scheme.

I have now the honor to submit, for sanction, the report and plans (in original) for the Ludhiána drainage scheme.

2. As His Honor is well acquainted with Ludhiána it is quite unnecessary for me to enter into any justification of the scheme. The deep and narrow drains (the cleaning of which, except by some unusual flush of rain-water, is impossible) are the greatest reproach to the populous city and must be always a source of disease as well as of daily discomfort.

3. The plan was submitted before Mr. Macnabb left, so that I am able to state that he approves of it. The report and plan seem to me to do great credit to the talented Engineer, Mr. J. C. Hammer, who proposed them.

4. The first difficulty was naturally about funds; and when the scheme was submitted to me it came with a proposal for a loan which was to be paid off by degrees.

5. This proposal I asked Mr. Wakefield carefully to reconsider, and I am now glad to learn that as this work must necessarily be one of time (though as each section is completed, the benefit will begin to be felt), it will be possible to provide for the expenditure, extending over about 6 years, out of the ordinary income of the city.

6. Mr. Wakefield reports that there is a balance in hand of Rs. 45,000 to begin with, besides which Rs. 15,000 a year can easily be set aside. This will in 6 years give Rs. 90,000. Thus a total of Rs. 1,35,000 is provided. A table of income, charges and balance is appended. The average balance of three years has been Rs. 10,206, but there seems to be no reason why, when the work is definitely in hand, and with care and economy, the required annual sum of Rs. 15,000 should not be made available.

7. As regards establishment, the Municipal Surveyor and two Sub-overseers, who were employed by Mr. Hammer in making the surveys and levels, are quite equal to carrying on the work, as they understand the details already.

8. I beg also to add a copy of the first nine paras. of Mr. Wakefield's No. 119 of 9th April, originally submitting the plan; the rest of the letter is not transcribed, as it relates to the loan, the proposal for which has now been superseded.

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* NOTE by Sanitary Commissioner.—The water has since been analysed by the Chemical Examiner and found suitable.

Copy of paras. 1 *to* 9 *of a letter No.* 119, *dated* 9*th April* 1880, *from the Deputy Commissioner, Ludhiána, to the Commissioner and Superintendent, Umballa Division.*

I have the honor to submit a Report in original with appendices of plans and estimate on Ludhiána drainage, furnished by Mr. Hammer, Civil Engineer, who has, with your sanction, been employed for the last four months in the preparation of this important project.

2. The report is very exhaustive and complete, and shows that levels have been taken of every turn and corner of existing drains and streets to the extent of nearly 200 miles, as well as of the line of country along which a water-cut from the Sirhind Canal could be brought, and also the bed of the Budha Naláh.

3. The fact of the existing system of drainage proving an utter failure is notorious, and has too often been made the subject of report by District Officers and Sanitary Commissioners to require enlarged comment, and Mr. Hammer's levels show that the drains have been on so faulty a system that it was impossible for them, with their defective gradients and ill-constructed beds, to answer the purpose for which they were intended.

4. The scheme submitted shows that for the sum of Rs. 1,24,382 a complete system of drainage with flushing by means of tanks, and wells could be introduced.

5. To bring a water-cut from the Sirhind Canal to flush the drains would cost Rs. 17,000 more.

6. The portion of the report on the wells is also interesting, and shows that the water springs of the wells come from the higher ground to the south of the town and cannot be affected by the Budha Naláh. This water was originally good but has now become affected by surface pollutions, a process which I believe is almost inevitable in all old towns in India.

7. It is difficult to prevent this except by the introduction of a radical change such as the carriage of water in pipes, and we are debarred from pursuit of such a luxury by the expenditure, which is beyond the means of towns like Ludhiána.

8. I think, however, that the present wells should be all covered, and this I hope to effect gradually.

9. I concur with Mr. Hammer in thinking that little can be done to divert the Budha Naláh, but I think the swamp that at present exists between the Grand Trunk road and Railway bridges might be drained and otherwise prevented by banking just at that spot and thus preventing the stream spreading out.

Copy of a letter No. 392, *dated* 21*st October* 1880, *from the Secretary to Government Punjab, to the Commissioner and Superintendent, Umballa Division.*

I am desired to acknowledge the receipt of your letter No. 399, dated 8th current, and enclosures, relating to a project for an improved system of drainage for the town of Ludhiána, at an estimated cost of Rs. 1,24,382, which it is proposed to spend out of balance in hand and out of surplus current income of the next 6 years.

The financial bearing of the question cannot be fully considered at present for want of certain explanation already called for from the Deputy Commissioner in his Annual Municipal Return for 1879-80. It is by no means clear that an annual surplus of Rs. 15,000, or even Rs. 10,000, can be ensured at present. The surplus for 1879-80 was only Rs. 3,939, though the receipts of the year were Rs. 10,000 in excess of the three years' average shown in the Deputy Commissioner's present statement.

Meanwhile the papers will be referred to the Sanitary Commissioner for consideration and report.

The project will, of course, have to be finally considered and dealt with in the Public Works Department.

No. 393, *dated Lahore,* 21*st October* 1880.

Copy of the foregoing, together with the reports and plans of the project, forwarded to Surgeon Major H. W. Bellew, C. S. I., Sanitary Commissioner, Punjab, for opinion.

Copy of a letter No. 3944, *dated* 16*th November* 1880, *from Sanitary Commissioner, Punjab, to Secretary to Government, Punjab.*

With reference to your endorsement No. 393 of 21st ultimo, forwarding copy of a letter No. 399 of 8th October 1880, from the Commissioner and Superintendent, Umballa Division, to the Secretary to Government, Punjab, together with report and plans for the Ludhiána drainage scheme, which are herewith returned as received in original, I have the honor to state that I have gone over these papers carefully and come to the following opinions in regard to the several points dealt with in the project.

The proposals in Mr. Hammer's report for improving the Drainage and Water-supply scheme of Ludhiána town.

Mr. Hammer, C. E., opens his Report on the Drainage and Water-supply Scheme by an enumeration of the principal causes and imperfections which injuriously affect the sanitary condition of the town of Ludhiána, and then proceeds to consider the measures by which these defects can be diminished or removed.

In para. 2 of his report he shows that the elevated position of the town presents to a certain extent special facility for drainage, and that the line for the outflow of this runs in an east-westerly direction. He also indicates the sites of two interior local depressions which interfere with the efficient drainage of the town in its present state.

In the 3rd para. he gives details of the population and area, and describes the street buildings and wells, and the conservancy arrangements. In para. 6 Mr. Hammer describes the existing drainage system, and enumerates the eight main drains by which the sewage and rain-water of the town is conveyed in different directions to its outskirts, pointing out their several defects.

Para. 7 refers to the "survey of the streets and drains, to ascertain their relative levels, to trace their communications, and to examine their general efficiency for the conveyance of sewage." The results are shown in the series of street sections (sheets 4 to 33) and in the large plan of the city and cantonment of Ludhiána.

Para. 8, referring to the plans and street sections, points out that in their present disposition many of the street "gutters have been sunk to a much lower level than is necessary and consistent with free outfall and effective drainage," especially in the complex of drains meeting near the Mission School and at the confluence of the sewers of streets 6, 20 and 21.

In para. 9 Mr. Hammer indicates the reason why in this town a system of underground street sewerage is not practicable, and very properly says—"It will therefore be necessary and preferable to renew the existing drains on the open gutter system, which has been found to be the most economical and suitable for oriental cities not provided with an artificial and constant water-supply."

Para. 10 of Mr. Hammer's report deals with the question of the retention or alteration of the existing outfall channel. He says—"In view of the many objections which have been raised against the discharge of the greater portion of the city sewage in immediate proximity to the Civil station, the proposal of diverting it to the east of Ludhiána near the Samrala road has been inquired into, but, from want of sufficient fall and from excessive interference with the alignment of existing street drains, been found impracticable. It is therefore proposed to retain the existing main drains in a modified form and to make proper provision for the utilization of the sewage by the establishment of manure tanks, similar in design to those adopted at Amritsar, near the outfalls which, on account of the contiguity of the Budha Naláh, cannot be placed at a greater distance from the town."

Sanitary Commissioner suggests that the sewage of the town be diverted towards Samrala instead of towards the Budha Naláh, and that saucer-shaped surface gutters be substituted for the deep parabolic drains proposed.

From an examination of the surface levels of the streets as shown in the large plan accompanying his report, and of the measures which Mr. Hammer proposes in the next paras. for improving the present drainage system, it appears to me that the proposal to divert the sewage of the town to the eastward near the Samrala road would not be found impracticable if ordinary saucer-shaped surface gutters are substituted for the deep parabolic drains proposed. The superficial surface gutters would give a greater inclination for the flow of sewage and could be more easily carried across depressions of the surface upon arched aqueducts, or sunk for short distance, where necessary, in covered drains. I would strongly recommend the further investigation of this point, because it appears practicable to carry the entire sewage and drainage of the town by one outfall sewer along the low ground behind the Jail on to the open country in the direction of Samrala, where the sewage could be utilized in irrigation of fields more extensively and with less chance of evil consequences than in the direction proposed towards and upon the bed of the Budha Naláh. The great objection to this latter site is not so much its proximity to the Civil station as the naturally unfavourable character of the ground itself, which lies low and is periodically flooded every year. The proposed plan provides for the discharge of the sewage below the Railway bridge, but the low land there is continuous with the Budha Naláh marsh belt above the bridge, and even without the addition of the sewage already possesses the evil characters common to marsh lands in general. If it is by any means possible to discharge the sewage on to some more favourably situated ground, I think the Budha Naláh direction should be carefully avoided. I would leave the present main outfall drain to carry off station water to the Budha Naláh, but would convey the sewage in a separate drain in the opposite direction where it could be carried further away from the town and utilized for irrigation more extensively and less detrimentally, and this, I think, will be found practicable if only superficial surface gutters are laid down instead of the deeper sunk parabolic drains proposed.

Mr. Hammer's proposal for the disposition of the drainage of the town where faulty.

Paras. 11 and 12 deal with the proposed improvement and disposition of the drainage, (1) by the construction of a separate outfall sewer taking off from the main drain between the Chowra Bazar and street No. 25 as shown in the large city plan and discharging on to low ground of Budha Naláh beyond the railway bridge; (2) re-adjustment of the bed of the main city drain by the construction of a central gully for the ready conveyance of the sewage; (3) construction of a main drain for the combined discharge of sewage and storm water between intersection of streets Nos. 8 and 9 and the head of the proposed outfall sewer in lieu of the drain now existing between these points as shown on the large city plan ; (4) the construction of a curved connecting channel with the main drain above the road of the proposed outfall sewer, and the construction of a circular gully in the bed of the existing drain between that point and its outfall in the station Naláh, the object being to retain the present drain as an escape channel for the storm water while the sewage is passed in the proposed separate outfall channel.

Sanitary Commissioner's remarks.

These proposed improvements are in connection with the plan for discharging the sewage of the northern part of the city at the site indicated near the Budha Nalah. If, as I believe is practicable, the sewage can be discharged in the opposite direction along the line of the Jail Naláh towards Samrala, these proposals will require modification. The construction of a circular gully in the bed of the existing main station and city drain would be an improvement and might be carried out independently of the rest of the plan.

Mr. Hammer's proposal continued.

(5) The construction of masonry manure tanks at the several outfalls to the south and east of the city; (6) the re-adjustment of street drains as to their respective levels ; (7) the construction of a masonry outfall drain in lieu of the open ditch emptying into the Jail Naláh ; (8) the provision of mud boxes at all points where street drains meet from opposite directions and are deflected into a common lateral discharging channel ; and (9) the establishment of flushing tanks near the head of the principal street sewers.

The maintenance of a number of different outfalls for sewage is, I think, a defective feature of the proposed plan. I think it would be better to provide an outside catchment drain along the north-east and south sides of the town, the two branches to meet at an outfall drain on the line of the Jail Naláh. This arrangement would probably do away with the necessity of many mud boxes, and also of the proposed flushing tanks, as the ordinary *bhisti* (water carrier) establishment would suffice to keep the street gutters properly flushed.

The disposition of the drainage alluded to in para. 12 appears to me very faulty, for in the following para. 13 it is shown to be discharged at no less than 9 different outfalls along the north, east, and south sides of the town, all independent of each other. This is a very serious defect, and might, I think, be obviated by an outside circular catchment drain from the Police Chowki on the north-west round to the Jail Naláh on the south-east, and from the village of Chownie on the south-west to the same spot on the south-east, where they would discharge into an outfall sewer conveying the sewage away towards Samrala.

The plan now proposed would, if practicable (which with superficial surface gutters for the streets I believe it to be, judging from the levels marked in the large city plan), provide for the disposal of the sewage of the whole city area by one channel on to a single site, where it would be well removed from the town and better placed for utilization in irrigation.

Street drains, flushing and manure tanks, &c., &c.

Paras. 14, 15 and 16 of the report deal with the capacity, inclination, and profile of the street drains. The provision made for storm water as well as sewage appears to me unnecessary, as the rainfall is limited to a particular season of the year and only then for a comparatively small number of days. It appears to me that the ordinary street gutters will suffice to meet the requirements of storm water without the special provision proposed by the parabolic drain, which, besides being more complex and costly than the simple superficial sancer-shaped gutter, presents the disadvantage of a deeply sunk and narrowed sewage channel which it is not only more difficult to keep clean by flushing and sweeping, but also more difficult to deodorize by the natural action of the sun. I would recommend the adoption of good masonry surface gutters in preference to the double drain proposed, because, whilst answering all the purposes of sewage carriers, they are more easily kept clean and wholesome, and also enable one to provide a better inclination than is possible with the deeper sunk drains proposed in the plan now under consideration.

Para. 17 refers to the velocity and discharge of the proposed parabolic street drains. By adoption of less deeply sunk sewer drains, better slopes can be obtained at less cost and at, I believe, less disturbance of existing arrangements.

Para. 18: the mud boxes or silt traps will probably be required at comparatively few places if the surface gutters are adopted as I recommend.

Para. 19 proposes the construction of flushing tanks "to be built of masonry and to be made also to serve as bathing-places, in lieu of the wells." There are 5 such flushing stations marked upon the large city map, *viz.*, two in the north-west quarter, one in the north quarter, and two in the south-east quarter, for the several outfalls in those directions. These may be an improvement, but I do not think they are absolutely necessary for the flushing of surface gutters, as this work can be done efficiently by the *bhisti* staff. It would be as well, however, to have them, especially as they are to be adopted to use as bathing-places.

Para. 20 deals with the disposal of the sewage for irrigation, and calculates that Ludhiána would require about 110 acres of farm land for the consumption of its sewage. So extensive an area is not available in the direction of the Budha Naláh, "and it is therefore proposed to reduce the sewage by precipitation of the solid ingredients in manure tanks and only to irrigate with the overflow for which it may be possible to find sufficient ground near the outfall of the drains." Still this would necessitate the supervision of several different outfalls, and precipitation or manure tanks in different directions entirely independent of each other.

Para. 21 describes the manure tanks proposed to be built as in design similar to those at Amritsar. So far as I understand, the precipitation tanks at Amritsar were built at the termination of the masonry drain to admit of the sewage flowing on in a clear stream in the further *kucha* channel in order to prevent its bed becoming choked by sedimentary deposit. I would for the same purposes advocate the construction of a series of three or four precipitation tanks at the tail end of the outfall sewer which, I think, it may be practicable to lead away from the town along the line of the Jail Naláh to its south-east.

Paras. 22 and 23 refer to the cost of the proposed works and available capital. The total estimated cost of the works is Rs. 1,24,382, and the total available capital is estimated at Rs. 1,55,032. The cost of an amended scheme on the plan I propose, *viz.*, surface street gutters, draining peripherally to an outside circular drain and outfall sewer, would, perhaps, cost less, whilst it provides a more comprehensive and complete system of sewerage. I think the work should be carried to completion without let or hindrance by loan from the Local Government, as proposed in the para. under notice.

Summary of objections to Mr. Hammer's Scheme.

This completes Mr. Hammer's report on the proposed drainage and sewerage scheme for Ludhiána. The main objections to the scheme which preent themselves to my mind are the large number of sewage outfalls at different spots close outside round three sides of the town, and the discharge of the principal portion of the sewage of the town on to the low-lying marsh land of the Budha Naláh, a tract which is inundated annually for several months, and lies in close proximity to the town. Mr. Hammer in para. 10, as before quoted, says that the diversion of the sewage to the east of the town near the Samrala road has been enquired into and found impracticable owing to the want of sufficient fall and excessive interference with the alignment of existing drains. But it seems to me that the impracticability may be the consequence of the kind of drains it is proposed to lay down requiring to be sunk deeper below the surface than would be necessary were the ordinary surface street gutter adopted instead of the proposed parabolic drain. I would therefore recommend a reconsideration of this point and an enquiry into the practicability of carrying the sewage in an outfall sewer away to the east along the line of the Jail Naláh, and also into the practicability of re-adjusting the street drains, so that they discharge peripherally into outside circular drains which coming from the Police station on the north and east sides and from the Chownie on the west and south sides could meet at the Jail Naláh and there empty into the main outfall sewer as before indicated.

If this is found practicable, it will, I think, enable the Municipality to provide a more simple, effective and comprehensive system of sewerage for Ludhiána than is promised by the plan now under discussion.

Comments on Mr. Hammer's Water-supply Scheme.

The rest of Mr. Hammer's report deals with the water-supply of the town of Ludhiána and a note on the Budha Naláh.

Para. 24 states that the drinking-water supply for the city is almost entirely drawn from public wells of which there are 285 in the town and 22 in the civil station. To ascertain the yield and capacity of the wells, Mr. Hammer selected 21, of which the water of ten had been analysed, and had carried out a series of experiments, the result of which is given in Appendix M. The experiments show that, with regard to the productiveness of the wells, if properly constructed of from 7 to 10 feet in diameter they will yield daily a volume of 2,400 cubic, or as much as two pairs of bullocks can conveniently draw to the surface, without a greater depression of the water level than two feet.

In para. 25 Mr. Hammer settles the question of the direction of ground water currents, and by taking the spring water levels of all the wells met with between Ludhiána and Duraha in a line nearly at right-angles to the Budha Naláh, as given in Appendix N, shows that the spring water level rises from 775·9 feet in the fort well (where it stands about one foot above the normal cold weather level of the Budha Naláh) to 800·73 feet at Duraha, or altogether about 25 feet in a distance of 14 miles; thus making it clear "that all the well water is derived from the high ground, excepting, perhaps, the water obtained from the small kutcha wells sunk on the low ground below Ludhiána for purposes of irrigation."

From a comparison of the water-level statements in Appendix M with those in Appendix N, it appears that several of the wells in that portion of the Ludhiána town which adjoins the bed of the Budha Naláh have their tubes sunk to a lower level than the water of the Budha Naláh, so that they may be partially fed from this source also. In the rainy season the flood of the Budha Naláh is said to rise nearly 4 feet, and at this season the water of the wells in proximity to its bank is also noticed to rise from 2 to 3 feet, or more. It would, therefore, appear that the water of the wells along its course is directly affected by the rise and fall in the flood of the Budha Naláh; the wells in the civil station and other distant parts of the town remaining unaffected by the flood.

Para. 26 deals with the quality of the well water, and explains the causes which render the water of certain wells impure. And para. 27 states that samples of well water have been sent to the Chemical Examiner, Lahore, for analysis. In para. 28 Mr. Hammer describes the means available for improving the water-supply of Ludhiána, and considers that there are practically only two methods within the reach of Municipal means. The one to sink additional wells "whence water can be raised by steam or bullock power into reservoirs for subsequent distribution through pipes or open channel:" and the other " to construct a watercourse from the Sirhind Canal, terminating likewise in a reservoir for supplying the southern part of the town." The canal water, as is pointed out by Mr. Hammer in the next para, 29, cannot possibly be taken into the higher situated parts of the town. I think the sinking of fresh wells as required will be a better arrangement, especially as after the completion of a good drainage system some improvement may be looked for in the quality of the water of the town wells.

The remaining paras., 30 and 31, deal with the course and cost of the proposed watercourse which it appears would be a boon more to the civil station than to the city.

Mr. Hammer's note on the Budha Naláh describes the origin and general course of the stream and its inclination. This is greater on the northern and eastern side of the town where its banks are under cultivation and free from swamps. On its winding round the west side of the town approaching the Grand Trunk Road bridge, the inclination of the bed is considerably diminished and the stream has formed wide swamps both above and below the Grand Trunk Road and Railway bridges. Lower down its course the slope gradually increases and the stream again flows " between firm and grass-covered banks."

In the rainy season the surface drainage of the country raises the flood of the Budha Naláh about 4 feet above its lowest cold weather level, and inundates the whole of the swamp tract lying below the west side of the town. The proximity of this swampy tract to the town has been considered to be one of the principal causes of its unhealthiness during the autumn months after the floods have subsided. The subjoined tabular statement of the mortality by months registered in Ludhiána from the year 1870 to 1879, inclusive, shows that the highest mortality occurs in the months of August to November immediately following the subsidence of the Budha Naláh flood. And the next tabular statement, giving the total registered mortality from the principal diseases for the same series of years, shows that the chief portion of the mortality is caused by the diseases classed under the head " fever " and from bowel complaints. So that it would appear that the Budha Naláh swamp does exercise a prejudicial influence upon the salubrity of the town.

Tabular Statement of the mortality by months registered in Ludhiána town from the year 1870 *to* 1879 *inclusive.*

Ludhiána Town,		January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total	Death-rate.
1870	...	125	65	58	92	137	140	58	90	135	153	204	136	1,393	35
1871	...	88	61	62	67	77	48	53	93	71	68	69	100	857	21
1872	...	59	41	51	68	64	49	50	517	184	133	103	62	1,381	34
1873	...	53	40	30	39	50	62	39	67	117	108	87	80	772	19
1874	...	70	75	60	74	78	94	78	144	124	128	96	122	1,143	28
1875	...	108	108	99	132	142	126	103	134	151	170	156	116	1,545	39
1876	...	90	67	53	58	88	75	74	126	265	310	290	175	1,671	45
1877	...	108	83	97	73	105	143	90	99	100	140	160	150	1,348	36
1878	...	137	111	111	136	188	206	191	196	390	1,074	1,228	538	4,506	111
1879	...	343	229	190	207	204	140	111	120	133	199	205	156	2,237	55

Statement showing total registered mortality from the principal diseases from 1870 *to* 1879 *inclusive.*

Ludhiána Town,		According to Diseases.					
		Cholera.	Small-pox.	Fever.	Bowel complaints.	Other causes.	Total.
1870	...	1	124	692	152	424	1,393
1871	...	1	1	422	75	358	857
1872	...	266	13	557	41	504	1,381
1873	...	...	6	305	83	378	772
1874	...	...	26	422	96	599	1,143
1875	...	1	178	569	126	671	1,545
1876	...	...	10	810	175	676	1,671
1877	...	...	7	589	123	629	1,348
1878	...	...	234	2,745	620	907	4,506
1879	...	22	51	1,292	265	607	2,237

With the view to ascertain whether it was possible to drain these swamps, Mr. Hammer has examined the levels of the ground traversed by the Budha Naláh for some distance above and below Ludhiána, and these levels together with situation are shown in sheet Map No. 2 accompanying his report. The results of his enquiry show that it is impracticable under the circumstances of the case to drain this swamp, since the low ground covered by it would still receive all the drainage from the high ground south of the city, whilst the diversion of the Budha Naláh stream into the proposed chord channel shown on the Map No. 2 would not suffice to effectively drain the swamps nor prevent their low grounds from receiving the surface drainage of the higher levels beyond to the north.

This being so, I think we must be content to leave the Budha Naláh alone and endeavour to diminish its bad characters by other means in our power. The most important of these is the diversion of the town sewage away from its beds, and for this reason I would strongly recommend the reconsideration of this scheme in connection with the points noted in the body of this review and an enquiry into the practicability of discharging the whole of the town sewage by a single outfall drain on to the land to the south-east of the city.

Another means by which I think the town may be protected from the exhalations arising from this swamp is the planting of a belt of the Eucalyptus or Australian blue-gum tree along the bank of the stream next to the city. The whole extent of the low ground on this bank both above and below the Railway bridge might be advantageously covered with plantations of these trees, the other economical uses of which will render them a great acquisition to the place.

Mr. Hammer's very interesting report and excellent maps and section sheets are herewith returned.

INSANITARY CONDITION AND DRAINAGE OF HANSI, A SUB-COLLECTORATE OF THE HISSAR DISTRICT.

Hansi drainage.

100. The following correspondence has transpired on this subject:—

Copy of a letter No. 160, *dated* 28*th October* 1880, *from Commissioner and Superintendent, Hissar Division, to Sanitary Commissioner Punjab.*

I have the honor to submit for your consideration copy of letter No. 133 of 11th June last from the Deputy Commissioner of Hissar regarding the insanitary condition of the town of Hansi in consequence of the present state of the old mill stream, and recommending that a new irrigation channel which has been sanctioned by Government, but for which no provision has been made in the current year's Budget from Western Jumna Canal, should be constructed, and that, if you concur in the proposal, Government should be moved to provide the funds at an early date.

2. The Deputy Commissioner does not appear to be very sanguine as regards the benefits the proposed scheme is likely to secure in improving the sanitary condition of the town; and in this I concur. The new scheme is simply an irrigation channel which will bring new land under canal irrigation and at the same time feed the bathing-tanks round the town. The only difference will be that the old mill stream which now feeds these tanks will be closed. It will not be filled up, as it will be too expensive, so that it will always remain as a sort of open drain full of stagnant water after rain, or should any of the tanks overflow. In my opinion there is no immediate necessity for carrying out this scheme, and I have therefore delayed forwarding the Deputy Commissioner's proposal; but it is well that you should have all the facts connected with the case, should you propose to visit Hansi during the ensuing cold weather, and I now submit it.

3. In my opinion the insanitary condition of the town of Hansi has been greatly exaggerated. Looking at the Birth and Death Returns for the last two years, I find that the birth-rate is far in excess of the death-rate, and that the actual number of deaths is much less than that of any other of the larger towns in this and the adjoining District. The improvement I attribute to the stoppage of rice cultivation within Municipal limits.

Copy of No. 133, *dated* 11*th June* 1880, *from* M. MACAULIFFE, ESQUIRE, *Deputy Commissioner, Hansi, to* COLONEL C. C. MINCHIN, *Commissioner and Superintendent Hissar Division.*

Sanitary scheme of Hansi town.

In compliance with your Circular No. 41, dated 28th April 1880, directing that a comprehensive scheme of sanitation should be submitted through you to the Sanitary Commissioner, I have the honor to furnish the following report on the condition of the town of Hansi.

2. On the occasion of a visit to Hansi in the end of April last, Mr. A. Skinner, Senior Manager of the Skinner Estate, addressed me a letter, which I forward in original, on the insanitary condition of the town of Hansi. His letter I sent for report to the officer at present in charge of the district works. The latter has sent me his report, which I also forward in original. I have visited the place myself on two or three different occasions in company with Mr. Skinner, Mr. E. C. Palmer, Executive Engineer, Western Jumna Canal, and the District Engineer; and I have done all in my power to make myself acquainted with the subject mooted by Mr. Skinner.

3. I enclose a map showing the position of the town of Hansi and the surrounding canal. The present Hissar canal is, so far as I can gather, generally on the site of an ancient canal made from the Jumna by the Delhi Emperors. Under previous administrations it was not so much the object of native Engineers to make their canals straight, as to direct them in such a way as to confer the greatest amount of benefit on the people. I have no doubt that the position of the canal south of Hansi, marked A B C on the map forwarded herewith, is nearly, if not altogether, on the site of the ancient canal. It watered the rich land south of Hansi, and supplied the numerous tanks and bathing-places adjacent to the city.

4. I have no data at hand to enable me to state when the cut marked A D C on the map was made, or for what purpose, but it would appear to have been made some time when the canal was widened and improved under British administration. I could suppose an Engineer's object in making this channel might have been to extend cultivation, if I could discover that there was then or now anything worthy of the name of cultivation in that quarter of the canal A B C. Whatever the object may have been, however, both the old and the new canals were used either in turn or simultaneously up to the year 1872. The old canal turned a mill to grind corn in the Hansi Cantonment, and it gave water to the cantonments, while the northern canal carried the water in a straight line from the east of Hansi towards Hissar, and it gave off a few small watercourses to water some lands brought into cultivation after its construction.

5. It seems to me I shall make my subject clearer if I give a history of what has been done since 1872. On looking through the large file of correspondence in this office, I find from a letter of the Officiating Deputy Commissioner dated 12th October 1872, that owing to the two canals being in operation, or perhaps the southern canal being worked less than the northern canal, the water in the southern canal and its communicating tanks stagnated and putrefied, and there resulted a most dangerously insanitary condition of the town. The Officiating Deputy Commissioner therefore proposed to close the southern canal altogether. I note that the officer who made that proposal had only been acting for a short time as a Deputy Commissioner and I doubt whether he visited the northern canal at all; and he does not appear to have considered how, if the southern canal were closed, the existing area of cultivation south of Hansi could be irrigated, how the loss of the water from which the agriculturists had derived immemorial benefit could be compensated for, how the canal bed and the numerous tanks and bathing-places in its vicinity could be closed up, or, if they were closed up, what the people were to do without their usual supply of water for drinking and ablutions, the northern canal being at a most inconvenient distance from Hansi.

6. In February 1873 a letter was written by the Joint-Secretary to Government, stating that an estimate was under preparation for the cost of supplying the present irrigation from the duplicate canal channel, regarding its size and arranging for the passage of the town drainage across. I cannot find out who recommended this course to the Government, and I do not understand how the town drainage could ever have been taken across as proposed. I find a long letter of the Commissioner of the 4th March 1873 on the insanitary condition of Hansi. To this the Deputy Commissioner replied on the 3rd of April 1873, entering fully into the sanitary details of the Commissioner's letter stating that the stagnant water of the town could only be drained into the canal, and giving estimates of the cost of filling up the canal and tanks and hollows in its vicinity. The Commissioner, by his letter No. 82 of the 14th April 1873, replied to the Deputy Commissioner's letter, but this letter apparently the Deputy Commissioner saw a difficulty in answering.

7. On the 3rd of May 1873 the Deputy Commissioner sent a scheme of general improvement of the Hansi, Hissar and Bhiwáni Municipalities to the Executive Engineer, Hansi Division, W. J. Canal. On the 17th May 1873 the Executive Engineer returned the scheme without offering any opinion on it, and it is not clear that the scheme was not submitted to him by mistake, as he had nothing to do with Municipal works. On the 23rd of the same month the same scheme was submitted to the Sanitary Commissioner, who returned it with thanks, signified his general approval of it, but stated he would wait until the Executive Engineer had submitted his report. On the 23rd May 1873 the Commissioner re-opened the correspondence with the Deputy Commissioner, and by this time the Superintending Engineer had come to visit Hansi. The Commissioner's letter contains a detail of schemes which had been agreed upon by him and Colonel Fulton. The Commissioner proposed to the Deputy Commissioner to stop irrigation around Hansi, to let the lands go out of cultivation, and he ordered the Deputy Commissioner to submit an estimate of the reduction of revenue which would be rendered necessary in consequence. On the 4th of July the Deputy Commissioner submitted a statement of the reduction of land revenue, and on the 17th of the same month he submitted to the Commissioner the scheme for the improvement of the Hansi, Hissar and Bhiwáni Municipalities, which had previously been submitted to the Executive Engineer of Irrigation Works, and to the Sanitary Commissioner. The scheme was returned by the Commissioner for modification and re-consideration on the 23rd of July, and was duly re-forwarded by the Deputy Commissioner.

8. On the 19th of September 1873 the Government sanctioned the proposals contained in the Commissioner's letter to the Deputy Commissioner of the 23rd May 1873, a copy of which appears to have been sent to the Government, and on the 8th October 1873 the Deputy Commissioner was ordered to carry out the proposals referred to. The Deputy Commissioner accordingly issued instructions to the Tahsildár and Executive Engineer to carry out the orders of the Government. In December 1873 the Executive Engineer remonstrated against the proposed schemes, pointed out the great hardship they would

entail on cultivators, and earnestly requested that the irrigation might not be stopped until the end of the current Rabi. The Deputy Commissioner replied that his orders were for immediate action, and that he had no power to postpone the closure of canal irrigation till the end of the harvest. On the 12th of January 1874 canal irrigation was stopped after the people had planted their crops, and there then ensued the usual correspondence for compensation for loss incurred.

9. Here the correspondence with the Deputy Commissioner terminated for the time, but, so far as I can gather, the Irrigation Department (as the result of all the letters that had been exchanged since the officiating Deputy Commissioner mooted the question in October 1872) closed a considerable portion of the canal to the south of Hansi, and left the remainder of the canal, the tanks and the bathing-places near the city as they had been before. The consequence was that the insanitary condition of the town grew rapidly worse than it ever had been, and the mortality in it alarmingly increased.

10. The matter was again taken up on 14th September 1876 by the Deputy Commissioner. He forwarded to the Commissioner a representation made by the Municipality of Hansi, and a report by the Assistant Surgeon setting forth the highly insanitary condition of the town, and he earnestly solicited the Commissioner to bring the matter to the notice of the Canal authorities, with the view of remedial measures being immediately taken. The Commissioner, in his No. 182 of the 22nd September, replied that the " Assistant Surgeon's report was so long and so absurd a composition, that he would only excite the ridicule of the Officers of the Canal Department by forwarding it to them, " and he directed the Deputy Commissioner to refer the matter himself to the Irrigation Department. The Deputy Commissioner did so, and, in his letter to the Executive Engineer of the 29th September 1876, stated that the "water in the channel flowing in front of the town had become quite stagnant and offensive, and that the malaria arising therefrom was most prejudicial to the health of the people," and he asked that remedies should be immediately applied. I do not find any reply to that letter in the file of correspondence in this office. I have very little doubt that the Canal Officers saw that a mistake had been committed in closing a portion of the Southern Canal, and thus increasing the evil that had been complained of in 1872, and he probably took no notice of the Deputy Commissioner's letter.

11. I find no further correspondence with the file until the 2nd of March 1877, when a new Commissioner re-opened the question of the sanitation of Hansi. In his letter to the Deputy Commissioner he stated that native opinion was unanimous in favor of re-opening the Southern Canal, and in fact undoing what had previously been done. That Commissioner was transferred before the Deputy Commissioner's reply could reach him, and the Deputy Commissioner's reply was addressed to the Commissioner with whom the great mass of previous correspondence had been conducted. The Deputy Commissioner in reply stated that the Commissioner's proposals could be carried out, but they would cost 4,000 rupees, and until this sum could be got from Municipal income, he suggested that the Canal Department should do their own portion of the work. I find no reply to this letter of the Deputy Commissioner on the file.

12. A third correspondence on the subject was opened by the Commissioner, who on the 11th October 1877 addressed the Deputy Commissioner on the insanitary condition of Hansi, and forwarded to him a petition presented by the principal inhabitants of Hansi. The people remonstrated against the stoppage of the canal, they pointed out that their immemorial right of receiving water for their bathing-ghats and temples had been interfered with, and they asked that the Southern Canal might be re-opened, and a good supply of water afforded for men and cattle to drink from, and to admit of the people performing the ablutions prescribed by their religion. The Deputy Commissioner replied by his letter No. 268, dated 24th October 1877, that the discussion was, as the Commissioner was aware, not a new one, that the people had always been opposed to the closure of the canal, that their objections had been over-ruled when it was decided by the local authorities in consultation with the Superintending and Executive Engineers to close the canal on sanitary grounds. The Deputy Commissioner's letter ends as follows:—" But this matter having been decided otherwise by competent authorities, after consultation and inspection of the locality, and after due consideration of all objections urged at the time, I do not think it expedient that the long-vexed question should again be re-opened. It would appear also that the Superintending Engineer is averse to any alteration of existing arrangements, and he further points out in his Memo. No. 389 of the 28th ultimo that the Mill Channel (the Southern Canal) was filled up 4 years ago, at a considerable cost, in accordance with the then proposed scheme." It is easy, I think, to see that the Deputy Commissioner gave up all hope of himself improving the sanitary condition of the town of Hansi, and thought it useless to continue the correspondence under all the circumstances of the case.

13. On recently visiting the Northern Canal with Mr. E. C. Palmer, Executive Engineer, I found that it was at a considerable distance from the town of Hansi, and that, as above stated, it only gave off a few insignificant watercourses. I asked Mr. Palmer when the Northern Canal had been made. He informed me that he had seen no correspondence and could give me no information on the subject. I asked what inconvenience would result if the Northern Canal were closed (a small water-cut being left to supply water to the existing cultivation), and the Southern Canal re-opened. He did not seem to me to consider this an unlikely scheme, except that it would entail the construction of high banks to confine the water of the Southern Canal, and thus hinder its overspreading the fields in its vicinity. He told me, however, that another scheme had been approved of by his own Department, *viz.*, the construction of a new " Rajbaha" in supersession of the Southern Canal. This Rajbaha, which is a mile further to the south of Hansi, would lead to an increased area of cultivated land, and supply water to the existing tanks

and ghats near the city. The estimated cost of the Rajbaha is, I understand, Rs. 6,780. The Executive Engineer in a letter dated 8th instant refers to the scheme as follows :—

"No provision for the new Rajbaha sanctioned by the Local Government has been made in this year's budget."

The undersigned is of opinion it would be useless to suggest any other way of treating the problem until that sanctioned after due consideration of many alternative schemes is proved to be inadequate.

"As the Chief Engineer has expressed his opinion that the design now sanctioned is calculated to mitigate the evils complained of, Executive Engineer cannot give any opinion in the matter."

14. I am myself not certain that the proposed Rajbaha will completely amend the sanitary condition of Hansi, but as it has been proposed by scientific officers, I agree with the Executive Engineer in thinking that it should be allowed a trial, and I therefore beg you will recommend the scheme to the Sanitary Commissioner with a view to his moving the Government to sanction from Imperial Funds the amount of the Estimate, and execute the works as quickly as possible so as to check the yearly mortality of Hansi.

Copy of a letter from ALEXANDER SKINNER, ESQUIRE, *Manager, Skinner Estate, to* M. MACAULIFFE, ESQUIRE, *Deputy Commissioner, Hissar.*

Being interested in the welfare of the inhabitants of this locality, I trust I may be pardoned in venturing to represent the unhealthiness of this town, which every one seems unanimous in attributing the cause to the condition of the section of the W. J. C., known as the mill branch, into which a mass of offensive, putrid, decayed vegetable matter, has been allowed to accumulate. From time to time, extending over a long period of eight years and upwards, it has to my knowledge engrossed the attention of the Officers of the District, but owing to some unaccountable reason, the lengthy correspondence on the subject has resulted in nothing except the discussions on this head by various succeeding officials, and the state of the health of the town has been permitted to run on from bad to worse, and if remedial measures are not taken at once, the air already impregnated with malaria as high as it can, threatens to decimate the population. I cannot believe the Government are so unmindful of the welfare of their subjects as to knowingly permit such a state of affairs to exist without adopting ordinary and immediate remedy so as to effectually guard against the increasing chances of the poison infecting these low marshy surroundings of the town. I feel sure the matter requires but a proper representation and feasible measures to be suggested to have the growing evil once for all remedied. I would therefore beg to be permitted to suggest that of all the measures which have been put forward from time to time, the best in keeping with the times appears to me to be the re-opening of the junction outlet, thereby insuring a constant fresh supply of running water. We will of course have to guard against, in a very heavy rainy season or when the people in the districts above us are not using their supply of water, which is allowed to find its way into the canal at such times, supplemented as it frequently is by the drainage of the surrounding country and the supply of rain water, as well as to imperil our safety as it often has happened in my knowledge, against the floodings which would naturally follow by what is familiarly known hereabouts as inundations from back water; this extra supply might always be provided against by providing the tanks round the city, and both branches of the canal, excavated to a good depth, but not so low as when the bed of the canal was at its lowest, that the supply of water in these tanks if desired would be drained effectually by the bed of the canal itself forming the escape for them as it was wont to in days gone by before it was allowed to get silted thoroughly up as it has been and in the state it is now. It cannot be denied that the water from the main canal used to be used by lifts alone of a very considerable depth; now, as any one can see, the water in the canal runs higher than the level of the surrounding country. However, much as this is to be regretted, that the canal should have been allowed to drift into this condition is not a matter now to be discussed, but the fact remains, that owing to this lamentable neglect, the health of the population is so affected thereby that some absolute and imperative measures to alleviate their sufferings and distresses be adopted without further loss of time, or before the rainy season commences again, so as to counteract the increasing miasmatic influences of the putrid marshes around, and avert thus the evil complained of. In conclusion, I have only to say that if this letter succeeds in obtaining the desired action in the matter I shall have been thoroughly recompensed. I need hardly say that if immediate action be adopted I shall be only too glad to have the opportunity afforded to join pecuniarily in a just and good cause if desired.

MEMO.

This communication of Mr. Alexander Skinner directs attention to the obnoxious condition of the Hansi mill channel.

2. About two miles to the east of the Hansi Town a branch channel takes off from the W. J. Canal, and, running in a southerly direction, passes under the walls of the town on the south, and, curving round it, runs back into the main canal about a mile to the west of the town. The main canal flows by the town on the north; so that the town is completely circumvented by the canal and the mill channel.

NOTE.—The name of the writer of this Memo. has not been given.

3. The original object of the mill channel was to carry a supply of water to work the mills near the town; and the portion of this channel below the mills to the main canal, carried back the water, after it had been used at the mills, to the main canal. In time, bathing " ghats " were built by the town-people on the margin of this channel and some large tanks began to be supplied and irrigation carried on from it.

4. On Hansi being abandoned as a military station the mills fell into disuse, and ever since the mill channel has been used only to supply the bathing " ghats," tanks and gardens.

5. I am not aware what led to it, but some years ago the tail end of the mill channel was closed up, and thus the constant flow of fresh water through it was interrupted and the channel from the mill bridge to the Hissar road bridge turned into a sort of shallow stagnant reservoir, occasionally filled from the canal.

6. The channel in its present condition has no uniform width, and just below the walls of the town has the appearance of a marsh, overgrown with rank vegetation, and is no doubt a constant source of malarious exhalations, which contribute in making the Hansi town so marked for its feverish and unhealthy conditions.

7. For some years the Civil authorities have been urging on the Irrigation Department the necessity of some remedy being applied to this undesirable condition of the mill channel, and I believe the proposal that finds most favor with Colonel Fulton, Superintending Engineer of the Western Jumna Canal, is to do away with this mill channel altogether and make a new Rajbaha which will run a good mile further south of the town and take up the irrigation and supply the existing tanks and ghats. I am not aware what progress this project has made, but the line runs over easy country, and the arrangements for taking up the irrigation and supplying the tanks and ghats can be very simply done, and, beyond the preparation of the estimate and its sanction, there are no difficulties (having the funds) in having it speedily carried out.

8. Moreover, as the above scheme is the one that finds most favor with the Canal authorities, there is no chance of any other, perhaps a simpler and more economical plan being adopted. I may however mention some suggestions that I made when I was in charge of the canal which could have been carried out at a small outlay, and in my opinion been very beneficial.

9. I proposed—

1st—To open out the channel again as far as the junction and keep the water constantly flowing through it.

2nd—To clear out the silt and make the channel of a uniform width, say 4 feet bottom, side slope 1 to 1.

3rd—To make masonry openings for ghats and tanks and lead the water into them through a narrow channel.

Copy of a letter No. 3998, *dated* 18*th November* 1880, *from Sanitary Commissioner, to the Secretary to Government, Punjab.*

I have the honor to submit herewith, for the orders of His Honor the Lieutenant Governor, originals of the correspondence noted in the margin, recently received in this office from the Commissioner and Superintendent, Hissar Division, together with my remarks and recommendations on the points noted thereon.

As explained in Colonel C. C. Minchin's letter No. 160 of 28th October 1880, to my address, the subject of Mr. Macauliffe's letter No. 133 of 11th June 1880 relates to " the insanitary condition of the town of Hansi in consequence of the present state of the old mill stream, " and recommends " that a new irrigation channel which has been sanctioned by Government, but for which no provision has been made in the current year's budget from W. J. Canal, should be constructed, and that if you concur in the proposal, Government should be moved to provide the funds at an early date. " Neither the Commissioner nor the Deputy Commissioner is " very sanguine as regards the benefits the proposed scheme is likely to secure in improving the sanitary condition of the town." The Commissioner states that " the new scheme is simply an irrigation channel which will bring new land under canal irrigation, and at the same time feed the bathing-tanks round the town. The only difference will be that the old mill stream which now feeds these tanks will be closed. It will not be filled up, as it will be too expensive, so that it will always remain as a sort of open drain full of stagnant water after rain, or should any of the tanks overflow. " In the Commissioner's opinion there is no immediate necessity for carrying out this scheme, and he considers " the insanitary condition of the town of Hansi greatly exaggerated."

Before proceeding to notice the history of this mill stream as given by Mr. Macauliffe, I would here remark, in reference to this last point, that the record of this office shows the town of Hansi to be not a very unhealthy one, as will be seen by the subjoined tabular statement of its registered mortality by months and from the chief diseases for the years 1872 to 1880 (up to September).

The total absence of small-pox mortality in 1879 is a remarkable feature. There was no epidemic of the disease here last year, and the district had been overhauled by the provincial staff of vaccinators during the cold season of 1878-79.

Deaths registered in Hansi Town by months and by principal diseases from the year 1872 *to* 1880 *inclusive.*

Years.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.	Ratio.	Cholera.	Small-pox.	Fever.	Bowel complaint.	All other causes.	Total deaths from all causes.
1872 ...	43	40	33	33	27	36	29	47	69	57	58	62	534	39	...	2	309	26	197	534
1873 ...	37	21	32	25	29	25	19	18	45	35	42	40	368	27	...	3	232	14	119	368
1874 ...	23	40	34	34	62	23	39	20	25	33	42	38	413	30	...	30	164	35	184	413
1875 ...	30	38	48	47	45	45	20	28	35	74	60	39	509	37	...	50	218	42	199	509
1876 ...	22	36	35	23	39	21	35	27	53	61	65	52	469	38	...	24	249	42	154	469
1877 ...	33	32	24	21	27	26	19	16	14	18	26	31	287	23	...	11	153	17	106	287
1878 ...	50	29	28	39	39	57	31	35	61	177	133	67	746	61	...	69	554	27	96	746
1879 ...	45	29	24	101	94	24	13	21	39	47	59	45	541	44	132	...	312	18	79	541
1880 ...	35	28	16	16	35	29	18	26	19	...	...	...	222	23	...	...	140	14	68	222

In my inspection report of this town (November 1877) I described how its site is enclosed between the Hansi canal and its Panchakki loop branch (the mill stream of this correspondence), drew attention to the insanitary condition of the latter owing to its channel being obstructed by mud, silt and rank vegetation and being the receptacle of much of the sewage of the town, and referred to the facilities afforded for an efficient system of surface drainage by the natural elevation of the site of the town, which admits of an outfall sewer being carried across this mill stream to the low land to its south.

In his letter above noted, the Deputy Commissioner gives a brief history of what has been done since 1872 with reference to this mill stream, and furnishes a map which shows the position of the town of Hansi and the surrounding canal. He also forwards with it, in original, a letter from Mr. Alexander Skinner, Manager of the Skinner Estate, and a report from Mr. E. C. Palmer, Executive Engineer, Western Jumna Canal.

From the Deputy Commissioner's account it appears that as long ago as October 1872 this mill stream became the subject of official correspondence, owing to its very unsatisfactory sanitary condition, which is thus described. " The water in the southern canal and its communicating tanks stagnated and putrefied, and there resulted a most dangerous insanitary condition of the town. The Officiating Deputy Commissioner therefore proposed to close the southern canal altogether." This proposal, it would appear, was negatived, as it would have deprived the agriculturists and town-people of the water-supply they had been in the long enjoyment of. For in the following February the Joint-Secretary to Government wrote " stating that an estimate was under preparation of the cost of supplying the present irrigation from the duplicate canal channel " (the mill stream), " reducing its size and arranging for the passage of the town drainage across." It does not appear what became of this scheme, which it seems to me as the one best suited to the requirements of the case, for, as far as I can understand, the objection to the present mill stream arises from the stagnation of its contents by the closure of the channel towards the west, and the consequent insanitary condition of the ground traversed by it close to the south of the town where it receives much of the sewage discharged by the several outfalls in that direction.

The insanitary condition of Hansi was the subject of further correspondence between the Commissioner and Deputy Commissioner during the succeeding months, and on the 23rd May 1873 a scheme of general improvement of the Hansi and other Municipalities of this District, prepared by the Deputy Commissioner, was sent " to the Sanitary Commissioner (Dr. DeRenzy), who returned it with thanks, signified his general approval of it, but stated he would wait until the Executive Engineer had submitted his report." The details of this scheme do not appear to have been again referred to the Sanitary Commissioner, nor are they given in the letter now under reference ; but it would appear from Mr. Macauliffe's account that it was " to stop irrigation around Hansi and to let the land go out of cultivation." The scheme after modification and reconsideration was finally sanctioned by Government on the 19th September of the same year, and the Deputy Commissioner on the 8th October was ordered to carry out this proposal referred to, and after some correspondence with the Executive Engineer, canal irrigation was stopped on 12th January 1874. Whatever was the nature of this scheme, nothing seems to have been done to remedy the insanitary condition of this mill stream. On the contrary, its condition was rendered even worse than that it was before by the measures which were then carried out. It appears that although a considerable portion of the canal to the south of Hansi had been closed towards its outlet of the west, the remainder of the canal, the tanks and the bathing-places near the city were left as they had been before. " The consequence was that the insanitary condition of the town grew rapidly worse than it ever had been, and the mortality in it alarmingly increased."

On the 14th September 1876 the matter was again taken up by the Deputy Commissioner, who "forwarded to the Commissioner a representation made by the Municipality of Hansi, and a report by the Assistant Surgeon, setting forth the highly insanitary condition of the town, and he earnestly solicited the Commissioner to bring the matter to the notice of the Canal authorities, with the view of remedial measures being immediately taken." The Deputy Commissioner was directed to refer the matter himself to the Irrigation Department, which he did on the 29th September, stating that the "water in the channel flowing in front of the town had become quite stagnant and offensive, and that the malaria arising therefrom was most prejudicial to the health of the people," and asking "that remedies should be immediately applied." No action appears to have been taken upon this reference, and the western outlet of the canal remained closed as before.

The subject after this appears to have remained in abeyance till the 2nd March 1877, when the question of the sanitation of Hansi was re-opened by a new Commissioner, who stated to the Deputy Commissioner "that native opinion was unanimous in favor of re-opening the Southern Canal, and in fact undoing what had previously been done." The Deputy Commissioner replied "that Commissioner's proposals could be carried out, but they would cost 4,000 rupees, and until this sum could be got from Municipal Income he suggested that the Canal Department should do their own part of the work." No action appears to have followed upon this correspondence.

On the 11th October of the same year the Commissioner renewed the correspondence with the Deputy Commissioner "on the insanitary condition of Hansi, and forwarded to him a petition presented by the principal inhabitants of Hansi. The people remonstrated against the stoppage of the canal, they pointed out that their immemorial right of receiving water for their bathing-ghats and temples had been interfered with, and they asked that the Southern Canal might be re-opened, and a good supply of water afforded for men and cattle to drink from, and to admit of the people performing the ablutions prescribed by their religion." The Deputy Commissioner replied "that the objections of the people had been overruled and the canal closed on sanitary grounds by the local authorities in consultation with the Superintending and Executive Engineers, and he did not think it expedient that the long vexed question should again be re-opened" He further pointed out "that the mill channel (the Southern Canal) was filled up 4 years ago, at a considerable cost, in accordance with the then proposed scheme." As I have before remarked, the details of this scheme are not given by Mr. Macauliffe in his letter under notice, but it would seem that only the western portion of the mill stream was filled up, thus closing its outlet, and causing a stagnation of water in the remaining portion of the channel.

Mr. Macauliffe closes his history of the mill stream by the suggestion that the Northern Canal might be closed and the Southern Canal re-opened, and adds the statement that the Canal Department had already approved of another scheme, "namely, the construction of a new Rajbaha in supersession of the Southern Canal," at an estimated cost of Rs. 6,780. The new Rajbaha as traced on the map is shown to run at a distance of about a mile to the south of Hansi. "It would lead to an increased area of cultivated land, and supply water to the existing tanks and ghats near the city." But, as pointed out by the Commissioner in his forwarding letter, this new canal would in no way improve the condition of the existing mill stream, which would still remain a choked channel for the reception of surface drainage and the sewage of the town.

Finally, Mr. Macauliffe, whilst not himself certain that the proposed Rajbaha will completely amend the sanitary condition of Hansi, "agrees with the Executive Engineer in thinking that it should be allowed a trial," and therefore begs the scheme be recommended to the Sanitary Commissioner, with a view to his moving the Government to sanction, from Imperial Funds, the amounts of the estimate.

It will be seen from the detailed notice I have here made of Mr. Macauliffe's letter that the unhealthiness of Hansi is attributed to the very insanitary condition of the mill stream, which passes close to the south side of the town. This insanitary condition, it appears, at first became developed by the natural silting up of the channel and the neglect to clear it out periodically; and was increased after the removal of the Cantonment, when the stream fell into disuse, whilst the stagnation produced by the deposit of silt and growth of vegetation in the channel was greatly aggravated in its objectionable features by the discharge of the town sewage and surface drainage into the canal bed. The dangers arising to the health of the town-people from this most unsatisfactory state of the mill stream had been the subject of correspondence and discussion for several years, till in 1874 a proposal to close the canal was sanctioned and put into execution. But in doing this it appears that instead of closing the whole channel from the eastern end of the canal at the inlet of its water, only the western portion where it found its outlet was filled in as far as the Hissar bridge, as indicated on the map. So that instead of improving matters the condition of the canal was made much worse than it was before.

The proposal now approved by the Canal Department to construct a new Rajbaha may be very advantageous to the interest of that department, but I fail to see that it in any way benefits the sanitary condition of Hansi, or improves the most unsatisfactory condition of its mill stream, which would still be left as a receptacle of the town sewage and surface drainage.

From Mr. Macauliffe's account and my own knowledge of the locality, it appears that this mill stream runs along the line of natural drainage of the country. It would consequently be impracticable to obliterate its channel, but it would be easy to modify, or alter, if possible, its course to a greater distance from the Barsi gate of the town, and to remodel its banks, so as to allow of a steady and uninterrupted flow of water. At the same time, whilst provision is made for its periodical cleaning to prevent accumulation of silt, it should be protected against contamination from the sewage of the town by conveying this across its stream in an outfall sewer to discharge on to the low ground away to the south where it would be well removed from the town, and where it might be advantageously utilized in irrigation.

That portion of the canal opposite the town might be greatly improved by masonry ghats or embankments. As regards the construction of the new Rajbaha, as proposed, I agree with the Commissioner and think there is no immediate necessity for carrying out this scheme in connection with the sanitation of Hansi. I consider, however, that it is a matter of very pressing importance to remedy the unsafe and unsatisfactory condition of the mill stream, and I would strongly recommend that the amount sanctioned for the new Rajbaha be expended for the re-opening and remodelling of the mill stream channel, as above indicated. The remedy of the evils arising from this neglected mill stream is a far more pressing necessity than the construction of a new Rajbaha.

Copy of a letter No. 304 *of* 22*nd January* 1881, *from Secretary to Government, Punjab, to Sanitary Commissioner, Punjab.*

In reply to your No. 3998, dated 18th November last, on the subject of the insanitary condition of Hansi, owing chiefly to the present state of the old mill stream, I am desired to forward copies of the correspondence noted in the margin, and to state that the evils complained of will be largely removed by the proposed action of the Irrigation Department. The other evils which affect the healthy condition of the town must be remedied by the Municipality itself.

Memo. dated 11th December 1880, recorded by Secretary to Government, Punjab, Public Works Department, Irrigation Branch,—No. 5 C, dated 23rd December 1880, from Government Punjab to Commissioner, Hissar.

No. 1, dated 1st January 1881, Commissioner's reply and enclosures.

Punjab Government No. 305, dated 22nd Jany., to Irrigation Department.

2. The enclosures of your letter under reply are returned herewith.

Camp 11*th December* 1880.

OFFICE NOTE.

SANITARY IMPROVEMENTS NEAR HISSAR.

I have obtained notes from General Fulton, and Major Swinton, who was Executive Engineer of this Canal Division for some time.

The Commissioner is mistaken in supposing that it was intended to take up new irrigation from the proposed Rajbaha. It was merely to supply the tanks and take up existing irrigation without passing through the low ground occupied by the present channel.

It was proposed to level the existing channel between the Barsi bridge and the land.

Skinner's tank.—That near the Canal Inspection Bungalow and the Barsi gate tank could all be filled from the new Rajbaha.

The portion of the mill channel which is offensive is that between the Barsi Bridge and the land.

If a channel were opened through this, the sewage of Hansi would simply be taken into the canal and carried down to Hissar.

This, the present canal channel, is the only outfall for the drainage.

There is a depression to the south but no outfall, as the depression is closed by the high ground on which it is proposed to locate the new Rajbaha.

If the portion of the old mill channel which was closed be re-opened, the result will be the passing of much of the sewage into the canal and its being carried on to Hissar as before, and Major Swinton states that he can affirm from his own knowledge, obtained in conversation with the inhabitants, that the fear of losing water for their tanks and bathing-ghats is a principal factor in their opposition to the closing of the mill channel.

He would fill up and plant with trees the *dhobies*' tank, or cultivate it as a garden, and the low ground now occupied by the mill channel.

General Fulton has had levels taken since Major Swinton left, which prove the only possible outfall to be towards the canal at right-angles to the Kamisar tank, being the lowest point.

He advised Messrs. Mac Nabb and McMahon to lead the drainage of the town towards the Kamisar tank and perhaps end it in deep wells, sunk down to the tank, but this he holds should be done by the Municipality and not by the canal.

Funds can be found in the current year for the new Rajbaha, and for filling up the old channel.

Having no local knowledge I can only judge from the papers before me, and conclude that the new watercourse should be made and the old one closed and levelled. I do not like the suggestion to pass the sewage down to the sand, and it might affect wells for some distance round, but other proposals appear suitable.

(Sd.) H. W. GULLIVER, MAJOR-GENERAL,
Chief Engineer Public Works Department, Irrigation Branch.

Copy of a letter No. 5 C, dated 23rd December 1880, from the Secretary to the Government, Punjab, to the Commissioner and Superintendent, Hissar Division.

With reference to your No. 160 of 28th October, to the Sanitary Commissioner of the Punjab, and Dr. Bellew's No. 3998 of 18th November to this office (which is forwarded for your information in original and which should be returned with your reply), I am desired to send for your information copy of a Memo. recorded by the Chief Engineer and Secretary to Government, Public Works Department, Irrigation Branch, and to enquire if, after perusal of this, you have any proposals to make in modification of those contained in your report.

Copy of a letter No. 1, dated 1st January 1881, from the Commissioner and Superintendent, Hissar Division, to the Secretary to Government, Punjab.

In acknowledging the receipt of your letter No. 5 C, dated 23rd ultimo, forwarding in original Dr. Bellew's No. 3998, dated 18th November, which is herewith returned, and copy of a Memo. recorded by the Chief Engineer and Secretary to Government, Punjab, Public Works Department, Irrigation Branch, and with reference thereto, I have the honor to submit copy of a Memo. by the Deputy Commissioner, Hissar, and to state that if the old channel between the Barsi bridge and the bund is filled up, and water is supplied to the dhobies' tank, Skinner's tank and the tank near the Canal Inspection bungalow, the limits of which should be carefully defined and embanked, the only objection I have to the scheme is removed, and I concur in recommending the early construction of the new Rajbaha.

Copy of Deputy Commissioner, Hissar's Memo.

1. I have read a letter No. 3998 of the 18th November 1880, from the Sanitary Commissioner, to the Secretary to Government, and a Memo. of the 11th December, prepared by the Secretary to Government, Public Works Department (Irrigation Branch), on a scheme for the improvement of the sanitation of the town of Hansi. The Sanitary Commissioner, I observe, takes the same view of the matter as I do, and would prefer to re-open the southern channel on account of the difficulty of fully obliterating it and filling the useless holes and tanks in its neighbourhood. Unless this is completely done, rain water as well as water which escapes by leakage from the canal, must settle in the hollows and gradually give forth unwholesome malaria, while, if the southern canal were re-opened, it would be possible at all times to flush the tanks in its vicinity with fresh water and thus keep them pure and wholesome.

2. The Secretary to Government in the Irrigation Department, in opposition to the Sanitary Commissioner's proposal and mine, contends that if the southern channel were re-opened, the sewage of the town of Hansi would flow into the canal and thus be taken into Hissar. I find no reference to such a probability as this in the correspondence in my office. It is not because the sewage of Hansi escaped into the canal and was carried to Hissar, but on account of the insanitary condition of Hansi itself, that the Deputy Commissioner and Commissioner took up the matter in 1872, though, no doubt, the question of disposing of the town sewage is one that would be likely to subsequently occur. Indeed, from another part of the Memo. from the Secretary to Government in the Irrigation Department, it clearly appears that General Fulton proposed a scheme by which the town sewage would not escape into the canal. "He advised Messrs. Macnabb and McMahon to lead the drainage of the town towards the Kamisar Tank and perhaps end it in deep wells sunk down to the tanks, but this he holds should be done by the Municipality and not by the canal" I cannot, therefore, consider that the disposal of the sewage is one that can at all affect the question of the closing or re-opening of the southern channel. In the course of conversation with two officers who have been at different times Executive Engineers in charge of this canal, the objections they urged were that if both the northern and southern channels were kept open, there would be an inconvenient back-water in the southern one, owing to some difference of elevation of both channels, and it would also be necessary to keep chowkidars on the regulator on the Southern canal, and this would entail extra expenditure.

3. As, however, I gather that the Irrigation Department undertakes to fill up the southern channel altogether, and bring water for the bathing-ghats at a very reasonable expenditure, I shall not press my original proposal, but shall be satisfied if the plan proposed by the officers of the Irrigation Department receives a trial. Even should it fail from a sanitary point of view, a *Rajbaha* will be added to those already existing, and this cannot fail to be advantageous.

4. I notice that the southern canal has been kept open up to its most westerly Rajbahas, and this was no doubt with the object of not interfering with the existing cultivation. I presume that the canal officers in closing the southern canal will make arrangements for supplying water to the lands that have hitherto been cultivated.

5. As regards the Sanitary Commissioner's statistics of mortality in Hansi, I may state that my remarks on the insanitary condition of the town were based upon the statistics of mortality of 1878 and 1879. For the six years preceding 1878 the average death-rate was 32. In 1878 it rose to twice that number, while in 1879 the death-rate was 44. The death-rate as given by the Sanitary Commissioner for 1880 is certainly very low, but 1880 was an exceptionally dry year, the rainfall being only 13 inches, against an average of 18 inches for several preceding years. But whatever the death-rate of Hansi may be, the condition in which the land immediately to the south of Hansi has been left by the closure of the channel is decidedly unsatisfactory, and I hope that some scheme will be tried as early as possible for improving the existing state of things.

Copy of a letter No. 305, dated 22nd January 1881, from the Secretary to the Government of the Punjab, to MAJOR-GENERAL H. W. GULLIVER, R. E., *Joint Secretary to Government Punjab, Public Works Department (Irrigation Branch).*

In continuation of this office Memo. dated 4th ultimo, forwarding letter received from the Sanitary Commissioner and Commissioner, Hissar, regarding the insanitary condition of the town of Hansi, owing to the present state of the old mill stream, I am desired to forward the accompanying copy of a letter No. 1, dated 1st instant, from the Commissioner, Hissar, on the subject, and to state that it is understood from the Chief Engineer's Memo. that the changes now mentioned by Colonel Minchin will be undertaken by the Irrigation Department, and I am to ask that when the work has been completed the fact may be reported to this office.

2. I am further to add that His Honor considers that the alterations proposed by the Irrigation Department should be carried out by an early date, and Sir Robert Egerton wishes the officers of that Department to communicate with and assist the local officers in remedying the existing insanitary condition of Hansi.

Copy of a letter No. 36, dated 31st January 1881, from Commissioner and Superintendent, Hissar Division, to Sanitary Commissioner, Punjab.

In continuation of my letter No. 160, dated 28th October last, I have the honor to forward copy of letter No. 22, dated 19th current, from Officiating Deputy Commissioner of Hissar, with enclosure from the Executive Engineer, Hansi Division, proposing to re-open the mill channel and to abandon and close the portion of the main canal between the overfall and junction with the mill channel to the west of the town of Hansi, for submission to Government, if, as I understand is the case, this scheme meets your approval.

The only objection to it is that urged by General Gulliver in his Memo. dated 11th December, received with Secretary to Government's letter No. 5 C, dated 23rd December, in which he points out that if the mill channel is re-opened, the sewage of Hansi would simply be taken into the canal and carried down to Hissar. I have never heard this objection raised before, but I think it is not an insuperable one, and that stricter sanitary arrangements might prevent the sewage getting into the canal at all.

I had previously recorded my opinion that if the old channel between the Barsi bridge and the Bund is filled up and water is supplied to the dhobies' tank, Skinner's tank, and the tank near the canal bungalow, the only objection I had to the Rajbaha is removed, but if proper arrangements are made to prevent the town sewage falling into the canal, the revised scheme is the best of the two in my opinion.

Copy of No. 22, dated 19th January 1881, from M. MACAULIFFE, ESQUIRE, *Officiating Deputy Commissioner, Hissar, to* COLONEL C. C. MINCHIN, *Commissioner and Superintendent, Hissar Division.*

I have the honor to forward, in original, letter No. 51C of the 18th instant from the Executive Engineer, Hansi Division, W. J. Canal, to my address, and to request you will forward it to Government through the Sanitary Commissioner, in continuation of this office No. 133 of the 10th June last regarding the sanitation of Hansi.

The letter of Mr. Palmer, Executive Engineer, is so clear in its details and takes such a practical view of the case, that few arguments of mine will be required to recommend it. I may, however, recapitulate the contents of my former letter on the subject, and state that Mr. J. W. MacNabb, Commissioner, Mr. Daniell, formerly Executive Engineer, Mr. Palmer, late Executive Engineer, the native residents of Hansi, and myself have all been in favor of opening the canal channel south of Hansi; and I now find that the Sanitary Commissioner and the present Executive Engineer are in favor of the same proposal. There is, therefore, a very general concensus of opinion that a mistake was committed some time ago in closing any portion of the southern channel, and that the evils complained of so long ago as 1872 will not be remedied by the recently proposed Rajbaha.

On, a few days ago, again visiting Hansi with Mr. Phelan, Executive Engineer, I ascertained, in the first place, that the scheme recently proposed for the sanitation of Hansi does not include filling up the mill channel from the mills to the Barsi gate bridge, a distance of 1,300 feet. In the second place, it does not include filling up the *Lal diggi* near the Umra gate, which is far the worst pool around Hansi, and which under present circumstances could only be filled up by bringing earth from the old fort at great expense. In the third place, the scheme does not include the cost of a drain from the Umra gate to the Kamisar tank; the three works would have to be done at the expense of the Municipality, and, as far as I can judge, more than the Municipality could afford would be required for their execution.

I trust that the proposal now made by Mr. Phelan, so conclusively superior as it is even in a financial point of view to the late proposal, of the construction of a Rajbaha and a partial obliteration of the southern channel, will receive your support and the sanction of the Government. I have never had any doubt that this was the only effectual measure for the sanitation of Hansi; and in formerly consenting under a protest to a compromise, I was only actuated by a desire not to oppose a scheme which I understood found favor with the Superintending Engineer, but on the contrary to allow it a fair and reasonable trial. I am now, however, satisfied from all the arguments that have been urged and a full reconsideration of the whole question, that such a trial would be useless and only delay a settlement of the question, and that there would be much unprofitable expenditure of money, if not loss of life, while the trial was being made.

Copy of a letter No. 50, *dated* 18*th January* 1881, *from the Executive Engineer, Hansi Division, W. J. Canal, to the Superintending Engineer W. J. Canal Circle.*

I have the honor to submit an opinion concerning the work proposed for rendering the vicinity of Hansi more healthy and for removing the objectionable stagnant pools.

2. As so much has been already written and the project has been decided upon, I refer again to this matter with diffidence. My reason for so doing is that the Deputy Commissioner, Mr. Macauliffe, does not expect the best result to follow from the construction of the new Rajbaha or the rest of the project.

3. I find that Mr. Palmer and Mr. Daniell coincided in the opinion I am now about to note. Besides I expect a large saving would occur from the changes.

4. My project is, in short, to re-open the mill channel, and to abandon and close the portion of the main canal between the overfall and the junction with the mill channel to the west of the town.

5. Were we now to have to make a new canal, and to decide between taking it to the north or south of the city, I believe that an Engineer would not hesitate to select the latter alignment.

6. The mill channel passes throughout the whole length of its course below the natural surface of the country. It is only in embankments where the alignment intersected a branch of a tank or some artificial depression, the banks are solid and well formed and no percolation would take place from them, no drainage line is intersected, and no flooding would likely take place were even a breach to occur. The alignment is some yards longer than the older or main channel, but the fall is ample and there is some to spare. The mills could be re-opened and again worked, as very probably a contractor would take them, were easy terms granted. They would increase in value very rapidly. The cost of re-opening the mill channel would scarcely exceed the cost of filling the bed as estimated.

7. Main canal on the contrary between the Hansi overfall and the junction is in embankment along the front of the town, it intersects the drainage outfall from the glacis of the Fort and water accumulates in depressions, and in the Kamisar Tank the banks are bad and leak, the percolation forms swamps along the banks. The irrigation is small and can be arranged for by a back channel from the junction and from a watercourse along the bank from the overfall. The canal should be cut cross to let out drainage water above and below the Goshien bridge.

8. The Lall diggi near the Umra gate on the mill channel is the worst feature: these would be warped up with silt in one season and be no improvement on its present condition. If the accepted project be carried out, this remains in a worse state than before.

9. The city people would prefer to have the mill channel re-opened; only some who fear that their irrigation in Ganj Shabidan suburbs would be cut off wish to have the main channel maintained.

10. The expenditure of between six and seven thousand rupees as proposed will bring no return whatever to the Canal Department, but, on the contrary, a large number of masonry works and an additional Rajbaha shall have to be maintained.

11. The saving I contemplate to effect will be over Rs. 4,000, and the project will gain in the adherence of the civil authorities, at whose request indeed the whole matter has been mooted.

12. Before work is actually started on the accepted estimate and project, I beg to suggest that the subject may receive your favourable consideration.

Copy of letter No. 416, *dated 3rd March* 1881, *from* SURGEON-MAJOR H. W. BELLEW, C. S. D., *Sanitary Commissioner, Punjab, to the Secretary to Government, Punjab.*

No. 36 of 31st January 1881, from Commissioner and Superintendent, Hissar Division, to Sanitary Commissioner, Punjab

No. 22, dated 19th January 1881, from Offig. Deputy Commissioner, Hissar, to Commissioner and Superintendent, Hissar Division.

No. 50 C, of 18th January 1881, from Executive Engineer, Hansi Division W. J. Canal, to Superintending Engineer, W. J. Canal Circle.

I have the honor to forward herewith copies of the correspondence noted in the margin " proposing to re-open the mill channel and to abandon and close the portion of the main canal between the overfall and junction of the mill channel to the west of the town of Hansi, " for submission to His Honor the Lieutenant Governor with the following remarks and recommendation.

The subject of Colonel Minchin's letter is in continuation of the correspondence ending with your No. 304 of 22nd January 1881, to my address, with enclosures, intimating " that the evils complained of in reference to the insanitary condition of Hansi " will be largely removed by the proposed action of the Irrigation Department," and that the other evils which affect the healthy condition of the town must be remedied by the Municipality itself."

In his letter to my address now under reference, the Commissioner and Superintendent, Hissar Division, states that " the only objection to it " (the proposal above quoted) " is that urged by General Gulliver in his Memo. dated 11th December, in which he points out that if the mill channel is re-opened the sewage of Hansi would simply be taken into the canal and carried down to Hissar. " This is the very point to which I have twice alluded in my letter No. 3998 of 18th November 1880, to the Secretary to Government Punjab, as to be provided against by conveying the sewage of the town across the mill stream and utilizing it in field irrigation upon the low-lying tract of land to the south of the town. The measure I think is quite practicable by catching the town sewage in an outside circular drain and conducting it across the mill stream in a masonry aqueduct between the Umra and Barsi gates on to the low grounds to the south and west of the town.

If this is done, then I am of opinion that the re-opening of the mill stream and closing of the main channel to the north of the town, as proposed by the Executive Engineer, Hansi Division, W. J. Canal, is far preferable to the construction of the new Rajbaha alluded to, which, as stated in my letter above indicated, would in no way remove the evils complained of in respect to the insanitary condition of the mill stream, however useful it might be for cultivation purposes.

It appears to me that the proposal to re-open the mill stream should be considered in conjunction with the provisions requisite to dispose of the town sewage. I do not think the rest of the combined projects would be beyond the means of the Municipality, whilst some return might certainly be looked for from the profits derivable from the utilization of the sewage for irrigation purposes. The proposal to sink the sewage in pits should be dismissed from consideration at once, not only as likely to produce a dangerous contamination of the spring water, but as unnecessary waste of very valuable manure material. If its value is not appreciated by cultivators of the place, the sewage might be turned to profitable use either by Government or the Municipality by raising fodder crops on the wasteland to the south and west of the town. Neither, for obvious reasons, should the town sewage be allowed to escape into the mill stream. Under the belief that the mill stream occupies the natural drainage line of the locality, I think it would prove easier and more advantageous in a sanitary point of view to repair and remodel its channel and banks to the requirements of the situation as a free flowing stream, than to attempt any partial patching here and there with the view to the obliteration of its channel. This may be done and yet in no way improve the drainage of the site.

I would recommend the re-opening of the mill stream, the repairing of its bed and banks and construction of masonry embankments opposite the town, and the closure of the main channel to the north of the town, both measures in conjunction with a plan for conveying the town sewage across the mill stream for irrigation purposes on waste grounds to the south and west of the town.

WATER-SUPPLY SCHEME FOR KOHAT.

Water-supply scheme for Kohat.

101. A scheme for the drainage and water-supply is under consideration. Necessary funds have been provided in the budget, and the services of a competent Engineer advertised for to draw up a comprehensive scheme.

Municipal income and expenditure Statement.

102. The statement overleaf shows the income and expenditure of the Municipal Funds in each district of the Province during 1880. The income inclusive of last year's balance, it will be seen, was Rs. 35,45,084 and the expenditure Rs. 24,82,538.

The amount expended on sanitary works including conservancy establishment was as follows :—

1.	Conservancy Establishment	Rs.	3,82,194
2.	Paving	„	68,914
3.	Roads and Bridges	„	2,15,339
4.	Drainage and sewerage	„	1,78,046
5.	Water-supply, including cleaning and repairing of tanks, wells, &c.	„	85,532
6.	Widening streets	„	578
7.	Construction of Latrines	„	25,062
8.	Repairs of Latrines	„	6,207
	Total	...	9,61,872

Or Rs. 1,71,628 in excess of that expended in the preceding year.

The income derived from sale of manure in Municipal towns during 1880 and two preceding years.

103. In my Sanitary Report for 1878 I appended a statement showing the sum that may, in round numbers, be annually realized by the 51 principal towns from the sale of their town-sweepings and taking the results achieved at Amritsar as a standard for guidance. I now append a table showing the amount realized in all the Municipal towns in each district of the Province from this source during the years 1878, 1879 and 1880.

Statement showing the income from sale of manure in each district of the Punjab during the years 1878 *to* 1880 *inclusive.*

Number.	Districts.	Population, census 1868.	*Income from sale of manure.* 1878.	1879.	1880.	Remarks.
1	Delhi	608,850	...	57	84	
2	Gurgaon	696,646	25	38	240	
3	Karnál	610,927	...	...	...	Not received.
4	Hissar	484,681	134	192	482	
5	Rohtak	536,959	...	...	...	Do. do.
6	Sirsa	210,795	322	152	200	
7	Umballa	1,008,860	80	141	101	
8	Ludhiána	583,245	393	954	1,119	
9	Simla	33,594	...	...	...	Not received.
10	Jullundur	783,020	865	942	952	
11	Hoshiárpur	938,890	414	394	453	
12	Kángra	743,758	...	...	7	
13	Amritsar	832,750	26,586	23,386	27,903	
14	Gurdáspur	906,126	2,124	2,704	2,577	
15	Siálkot	994,458	809	1,502	1,558	
16	Lahore	775,551	4,198	4,848	2,667	
17	Gujránwála	550,576	270	696	1,018	
18	Ferozepore	533,416	614	851	874	
19	Rawalpindi	699,647	408	377	2,691	
20	Jhelum	500,988	148	80	94	
21	Gujrat	616,347	237	320	392	
22	Shahpur	368,796	203	394	341	
23	Mooltan	459,765	83	230	313	
24	Jhang	348,027	932	889	894	
25	Montgomery	359,437	...	275	395	
26	Muzaffargarh	295,547	352	322	297	
27	Dera Ismail Khan ...	394,864	745	27	750	
28	Dera Gházi Khan ...	309,978	482	428	525	
29	Bannu	287,547	225	824	438	
30	Pesháwar	500,443	2,498	3,764	2,457	
31	Hazára	367,218	...	...	...	Not received.
32	Kohát	145,419	36	40	122	
	Total ...	17,487,125	43,183	44,827	49,944	

TABLE showing the Income and Expenditure of Municipalities

Names of Districts.	ASSETS.			DISBURSE						
	Balance from previous year.	Actual income for the year.	Total.	Conservancy Establishment.	Paving.	Roads and bridges.	Drainage or sewerage.	Water-supply including clearing and repair of wells, tanks, &c.	Widening of streets.	Construction of latrines.
Delhi	15,782	2,87,996	3,03,778	34,008	1,228	18,347	3,056	8,426	...	3,301
Gurgaon	30,592	70,092	1,00,684	8,464	2,015	2,828	446	1,096	94	6,653
Karnál	13,897	56,575	70,472	6,865	636	10,023	24	40	...	2,455
Hissar	39,247	60,808	1,00,055	11,591	25	3,172	279	515	51	100
Rohtak	14,100	34,289	48,389	4,544	276	4,758	67	810	160	...
Sirsa	40,459	36,409	76,868	3,195	148	5,044	673	5,052	...	1,568
Umballa	25,165	69,071	94,236	11,647	2,431	2,167	739	1,128	...	1,559
Ludhiána	62,467	77,094	1,39,561	17,664	1,514	2,161	4,955	130	...	384
Simla	29,069	1,54,414	1,83,483	21,060	...	25,170	66,980	...	...	...
Jullundur	14,334	67,893	82,227	11,606	4,520	3,900	1,169	75	87	234
Hoshiárpur	21,839	51,809	73,648	9,471	3,210	1,638	2,592	378	...	661
Kángra	6,574	16,423	22,997	1,480	472	1,593	...	666	..	...
Amritsar	1,50,968	3,31,299	4,82,267	44,272	...	28,040	45,415	7,118	...	1,336
Gurdáspur	17,170	55,076	72,246	6,660	3,030	943	572	2,160	...	132
Siálkot	5,510	47,033	52,543	4,559	1,791	3,814	300	45	...	...
Lahore	66,355	2,36,339	3,02,694	52,980	355	36,909	3,178	478	...	3,621
Gujránwála	27,020	60,845	87,865	8,487	7,736	1,869	821	3,112	...	...
Ferozepore	26,369	51,124	77,493	4,495	694	4,882	4,967	3,014	...	...
Rawalpindi	36,479	1,25,103	1,61,582	23,219	1,557	17,692	5,431	11,395	...	1,528
Jhelum	40,927	95,930	1,36,857	11,255	3,592	10,373	1,761	1,452	...	206
Gujrat	4,932	24,141	29,073	3,489	863	470	200	346	5	...
Shahpur	28,245	44,992	73,237	4,657	2,249	918	655	354	...	...
Mooltan	62,621	1,02,759	1,65,380	14,475	17,845	17,862	1,890	578	...	...
Jhang	11,201	35,530	46,731	5,263	600	173	437	981	...	...
Montgomery	4,513	16,886	21,399	1,686	117	157	152	141	...	300
Muzaffargarh	6,761	19,488	26,249	2,612	2,110	25	236	290	...	30
Dera Ismail Khan	25,165	69,071	94,236	11,647	2,431	2,167	739	1,128	...	1,559
Dera Gházi Khan	16,083	44,103	60,186	7,924	2,178	1,962	951	2,719	...	...
Bannu	9,951	38,492	48,443	6,445	4,791	127	419	900	107	96
Pesháwar	2,112	2,26,430	2,28,542	22,044	500	4,682	24,377	29,862	24	...
Hazára	4,749	19,190	23,939	1,812	...	572	127	178	...	...
Kohát	21,617	36,107	57,724	2,618	...	901	4,438	965	50	...
Total ...	8,82,273	26,62,811	35,45,084	3,82,194	68,914	2,15,339	1,78,046	85,532	578	25,062

in each District of the Punjab Province during the year 1880.

MENTS.									
Repairs of latrines.	Total sanitary charges.	Vaccination.	Dispensaries.	Police.	Schools.	Miscellaneous.	Total expended.	Balance unexpended.	REMARKS.
24	68,390	559	12,524	65,898	7,485	77,479	2,32,335	71,443	
153	21,749	...	6,976	13,701	7,439	11,237	61,102	39,582	
106	20,149	...	1,607	15,634	3,690	11,030	52,110	18,362	
141	15,874	...	4,413	15,253	3,200	6,013	44,753	55,302	
241	10,856	...	1,823	9,591	3,333	8,361	33,964	14,425	
92	15,772	...	3,054	5,388	2,982	13,152	40,348	36,520	
136	19,807	485	5,014	13,906	2,799	15,456	57,467	36,769	For Financial year ending 31st March 1880.
1,019	27,827	60	5,092	12,691	13,437	19,455	78,562	60,999	
897	1,14,107	...	1,001	10,478	754	44,324	1,70,664	12,819	
312	21,903	...	6,535	14,955	6,068	12,012	61,473	20,754	
236	17,525	11	4,105	11,424	2,459	10,737	46,261	27,387	In this District Rs. 661 have been expended by minor municipalities in excess of income.
...	4,211	...	3,680	2,535	2,140	3,755	6,321	6,676	
627	1,26,808	379	27,099	55,201	9,993	1,09,839	3,29,319	1,52,948	
...	13,497	...	4,422	10,601	8,013	12,640	49,173	23,073	
...	10,509	120	2,833	10,278	4,785	9,486	38,011	14,532	
108	97,629	837	9,286	42,457	8,230	95,011	2,53,450	49,244	
10	22,035	...	3,702	11,579	4,608	17,07	58,994	28,871	
57	18,109	11	5,489	7,318	3,970	14,008	48,905	28,588	
930	61,752	...	9,669	16,090	3,982	22,295	1,13,788	47.794	
460	29,099	...	7,785	11,553	1,942	19,764	70,143	66,714	
...	5,373	15	1,588	6,080	750	4,735	18,541	10,532	
120	8,953	...	3,420	9,579	3,739	8,053	33,743	39,494	
90	52,740	...	6,729	19,159	6,005	26,527	1,11,160	54,220	
...	7,454	120	4,288	5,938	3,055	6,132	26,987	19,744	
8	2,561	...	4,872	1,622	3,500	3,179	15,734	5,665	
79	5,382	...	1,158	3,884	1,855	6,042	18,321	7,928	
136	19,807	485	5,014	13,906	2,799	15,456	57,467	36,769	For the Financial year 1879-80.
25	15,759	...	2,201	6,139	3,709	13,732	41,540	18,646	
3	12,888	282	3,255	7,926	1,539	8,891	34,781	13,662	
189	81,678	300	6,406	42,928	1,836	91,705	2,24,853	3,689	
8	2,697	...	850	3,789	343	6,171	13,850	10,089	
...	8,972	...	390	6,361	1,184	11,511	28,418	29,306	
6,207	9,61,872	3,664	1,66,280	4,83,842	1,31,623	7,35,257	24,82,538	10,62,546	

It will be seen that there has been a slight increase in the income from this source during the year under review, compared with the two preceding years, but I may add that were more attention paid by the Municipal Committees and village lambardárs to my oft-repeated proposal of collecting all filth and refuse matters in carefully selected sites outside town or village limits, and selling the stuff for cultivation and other purposes, the income thus realized would, I am sure, in the course of another few years, not only be doubled and trebled, but every town and village would derive an income sufficient to maintain and self-support its own Conservancy Establishment.

Brief history of Sanitary progress in each district.

104. The following is a brief history of the sanitary progress made during 1880 in the Municipal towns of the Province, epitomized from the reports received from the Deputy Commissioners.

DELHI.

The Deputy Commissioner has not furnished details of the minor sanitary works executed during the year under review, but from the table of municipal expenditure it appears that out of a total of Rs. 2,76,567, including balance from previous year for the Delhi Municipality, Rs. 31,369 were spent on conservancy, Rs. 1,228 on pavements, Rs. 17,176 on roads and bridges, Rs. 3,032 on drainage or sewerage, Rs. 8,409 including clearing and repairs of wells, &c., and Rs. 3,061 on the construction of latrines. Of the smaller municipal towns, besides the usual expenditure on conservancy, Rs. 946 were expended on roads in Pánipat, Rs. 100 in Balabgarh and Rs. 125 in Najafgarh. In the latter town Rs. 200 were spent in the construction of latrines.

The conservancy of Delhi is reported to have worked successfully owing to the reorganization effected in it last year, so far as the cleanliness of the city and suburbs is concerned. This matter, says the Deputy Commissioner, " has received great attention from the Committee. The sub-division of wards and revision of establishment have been carried out, and the supervision by responsible members has resulted in much improvement in all the streets and thoroughfares."

GURGAON.

The following works were completed or entirely executed during the year :—

Rewári.

Seven latrines, completing the full number required; 2 slaughter houses; 4 cremation grounds have been enclosed with walls in accordance with a recommendation of Dr. Adam Taylor; 4 enclosures for storing town refuse. A new well has been constructed near the high school. All old wells have been cleaned. A public well in Gokal Bázar has been improved. The Gokal, Judli and Pith Bázars have been remetalled and the drainage improved. The grain market is being paved with flags and the drainage improved. Half of the circular road has been remetalled and two new culverts and three Irish bridges for drainage made. The road to the Solarai tank has been raised and drained.

Farukhnagar.

Two covered latrines. A new culvert for town drainage. Stagnant pools near Delhi gate filled up. All wells cleaned. The main bázar, with its three branches, is being remetalled and drained.

Palwal.

Two covered latrines, 1 slaughter house, 4 enclosures for storing town refuse. Hollow places have been filled up.

Fírozpur.

Latrines and drains repaired.

Sohna.

Four latrines repaired. 4 enclosures for storing refuse constructed. The sulphur baths have been cleaned twice a month. The main bázars are being paved, and an improved system of drainage has been introduced.

Nuh.

Two covered latrines.

Hodal.

One ditto.

The bázar roads have been raised and drained and a grant for remetalling them has been made.

KARNAL.

Karnál.

In the town of Karnál two streets, Diálpura street and Ghazni Bázar, have been metalled with kunkar and provided with saucer drains at a cost of Rs. 1,594 and Rs. 1,195, respectively. Similar work is in progress in the Jundlá Bázar street at an estimated cost of Rs. 1,998. A new slaughter house has been constructed at a cost of Rs. 388. It is after the pattern of the Delhi slaughter house and is paved with sand-stone. Two latrines for men and two for women have been constructed, at a cost of Rs. 461 each for the former and Rs. 234 each for the latter, and one for men and one for women are in progress. The roofs are domed. The floors are paved with sandstone slabs, and iron vessels, covered with coal-tar and provided with dry earth, are used for both solid and liquid matter. Privacy is secured. A Crawley cart for removing liquid matter has been ordered.

Pánipat.

In Pánipat the principal bazár running the whole length of the town has been metalled with kunkar and provided with saucer drains at a cost of Rs. 7,045. Similar work has been done on the street running from the Post Office to the Sadr Gunj gate, at a cost of Rs. 2,592. Two new latrines, one for men and the other for females, on the same plan as those for Karnál, and at the same cost, have been constructed. A new slaughter-house on a plan similar to the Karnál one is in progress at an estimated cost of Rs. 450.

Minor towns in the District.

No new work of importance has been executed in Kaithal, Pundri or Kunjpura during the year which has expired, but there is some street-paving now in progress in Kaithal, and preparation has been made for doing something *considerable* in all three towns during the year 1881.

The Deputy Commissioner, Mr. Benton, makes the following remarks regarding the improvements effected in the municipal towns of his district with reference to the suggestions made by me from time to time, on my inspection of these towns:—

> "If the Sanitary Commissioner will refer to his reports of inspections of Karnál and Pánipat last year and three years ago, he will see that a good beginning has now been made towards carrying out his suggestions regarding these towns. The work of paving and draining the streets in these towns, of providing proper latrines and slaughter-houses, and connecting the street drains with the channels that will carry off the drainage to the abandoned bed of the present Western Jumna Canal in the case of Karnál, and the Gunda Nallah in the case of Pánipat, will require all the funds available for two or perhaps three years. There will then remain the water-supply to be disposed of, and for both towns projects are now to be prepared for obtaining supplies from the Western Jumna Canal, that the question may be discussed and settled by the time the committees can commence the execution. A satisfactory and cheap system of disposing of the town filth will, it is hoped, be in operation during the current year. With regard to domestic cleanliness I fear that it will be the work of generations, but we have made an attempt in this direction as above described. In short, I would hope that if the Sanitary Commissioner made another inspection three years hence he would find that almost all his suggestions, which are immediately practicable and which do not involve an expense beyond the means at the disposal of the municipalities, have been carried out."

Mr. Benton deserves great credit for the intelligent zeal displayed by him in improving the sanitary condition of his towns, and my best thanks are due to Mr. Benton for the sustained interest he has taken in the promotion of sanitary work in his district generally.

With regard to the improvement of village sites in this district, it appears from Mr. Benton's report that an establishment consisting of one Superintendent on Rs. 100, two Deputy Superintendents on Rs. 20 each, 10 Jamadárs at Rs. 8 each, 1 peon at Rs. 5 per mensem, is maintained for the supervision of this work. These men move about the whole district, furnishing weekly reports, showing the state of the villages inspected, and during the winter tour, enquiries are made, localities visited, and improvements ordered.

HISSAR.

Drainage.

In the town of Hissar, in three different localities, the old pucca drains, which were narrow and deep and permitted rubbish to accumulate on their sides, were converted into saucer drains. The kutcha bermes of the roads were metalled and sloped at an outlay of Rs. 700. In Futahabad drains were improved, and one large drain which befouled the city tank was diverted in another direction. A wall was erected on the site of the old drain for the protection of the tank.

Water-supply.

The following sums were spent on the repairs and cleaning of the wells :—

			Rs.
1	well	at Hissar	14
8	wells	„ Hansi	40
31	„	„ Bhiwáni	75
1	well	„ Futahabad	80

Latrines.

The latrines in Hissar, Hansi, Bhiwáni and Rattia were repaired, and two latrines at Futahabad are being constructed.

The Deputy Commissioner was able, by proper management of the conservancy establishment, to effect a saving of Rs. 870. All the sweepers who were lazy and inattentive to their work were dismissed, while the Jamadárs were warned to exact the full amount of labour from the rest of the establishment. The result of these arrangements is, says the Deputy Commissioner, far better than in 1879.

ROHTAK.

Drainage.

No new drainage-works were constructed during the year under report, but existing works have been put under thorough repair at Rohtak, Bahádargarh and Gohana, at a cost of Rs. 67.

Water-supply, &c.

A large pucca tank has been excavated by a Mahajan of Jhajjar, named Bhaktávar Singh, at a cost of Rs. 1,000. The Municipal Committee of Jhajjar contributed Rs. 500 for construction of ghats upon this tank, which are being erected under the supervision of Rai Salig Ram, Extra Assistant Commissioner, and will, it is hoped, be ready within two months. Of the sum allotted by the Committee Rs. 400 have been expended. A new well constructed by the District and Municipal Committees in the compound of the Sadr Dispensary, at a cost of Rs. 623, the want of which was much felt. A pond in Beri, known as Ganda Johar, which formed a receptacle for the drainage of the sewers and gutters of the town, was filled up to the level of the adjoining ground. Two new roads in Rohtak, one in Gohana and four in Beri were metalled, and two new bridges in Rohtak constructed. A street in Bahádargarh was paved.

SIRSA.

Sirsa. Two sluices for rain-water were constructed, and the existing drains were generally repaired. A ghat or landing of the Jogiwala tank with raised sides for females, and a ghat for cattle of the Bahadura tank, were constructed. A portion of a new masonry well for supplying water to the residents near the Bahadura gate of the town was made, and the rest of it being pushed on. A drain to supply water to the Jogiwala tank from a branch cut of the Ghagger was also constructed. A latrine north of the town has been roofed. Hollows and pits of the town were filled and levelled.

Fazilka. Only one masonry drain was repaired and some outlets for water by surface scratchings were made. Three wells were constructed, two of which were within the town and the third on the road to the Okarah Railway station within municipal limits. A ghat or landing of a pucca tank was also made, and all the tanks were repaired and cleaned. Two latrines for males and females were constructed during the year. In this town there were certain deep hollows, all of which have been thoroughly filled with earth.

Rania. A drain was constructed near the Surbah gate of the town where rain water used to collect.

Ellenabad. There is only one tank in this town, and a portion of the landing of this tank has been made and the rest is under construction. This tank has also been deepened. The masonry pillars supporting pulleys of a well have partly been built and will be soon completed. All the wells were repaired.

Rori. The tank of this town was deepened and cleaned.

LUDHIANA.

The Deputy Commissioner has given no details of the minor sanitary works executed in the Municipal towns of the District. All that can be gleaned from the report under this head is that " 50 pucca and 10 kacha drains were repaired during the year." The statement of Municipal expenditure, however, shows that some money has been spent in the construction or repairs of roads and bridges, latrines and pavements in all the towns.

SIMLA.

Major Nisbet, the Deputy Commissioner of Simla, makes the following remarks in his report on the drainage, conservancy and water-supply of this sanitarium :—

" No large work of importance has been carried out during the year. A suitable conservancy scheme for Simla is still a problem of the future. The local features and conditions are very exceptional. No scheme should be rashly taken in hand. In the meantime a carefully contrived survey of the Bazár and Hill has, during the present year, been made at the expense of the Municipality by Officers of the Department Public Works, and a project will be considered and devised hereon. The two lakhs of rupees for a conservancy scheme, which is ample to meet the cost of such a project as would be necessary for Simla, was granted by the Government of India in 1878, but the amount has not been drawn by the Municipality. Any conservancy must hinge on the completion of the water works in their integrity as originally designed with sufficient storage reservoirs.

" The year under report has witnessed the conferring of an immense boon on Simla in the inauguration of the new water-supply. Although the works are incomplete the town had the advantage of over 40,000 gallons of water daily more than it ever possessed before, and when it is remembered that for some days in 1879 the whole available water-supply of Simla from the ordinary sources was 5,000 gallons the value of the addition made this year will be better understood. The water proved very pure and was much favored by Natives and Europeans. An attempt made by some people to associate the outbreak of an epidemic of diarrhœa which proved very general and troublesome this year (Report appended as an Appendix to the Report of the sanitary Commissioner with the Government of India for 1879) with the introduction of the new water-supply, entirely failed. The class of persons most troubled with the epidemic were adult Europeans, while natives, children both European and native, and total abstainers, who form the water-drinking classes, were nearly, if not entirely, exempt from the malady.

" I have stated that the new water-supply is incomplete and must remain so until a sufficient number of storage reservoirs have been constructed. At present only the reservoir at the church, sufficient for 12 days' estimated consumption, has been constructed. Any one who knows the drought that prevails at Simla two months before the usual annual rains will understand that with the greatest economy this must be insufficient. The Municipality were promised a complete water-supply project for Simla which included another large storage reservoir at Sanjoli on their contributing towards the whole cost of the works, seven lakhs of rupees ; this they have done, and it only remains for the Government of India to carry out the remaining works, which I trust will be done shortly without any unnecessary delay. Again, so far as any feasible conservancy project for Simla hinges on an abundant supply of water, especially at the driest season of the year, for flushing purposes—and it is pretty sure any scheme must do so—then nothing can be done in that way until the water-supply is placed entirely beyond doubt as to its sufficiency and permanent character."

JULLUNDUR.

In 1879 a project in connection with the Internal Drainage Scheme of the town of Jullundur was prepared, by which three more wells, in addition to the one at Abadi Killa, will be constructed for flushing the drains with water. During the year under report one of these wells was sunk, the remaining two will be taken up in 1881; by this arrangement *chabachhas*, or sinks for collection of household refuse, will be dispensed with.

Nothing of importance under the head of water-supply has been done, except cleaning of wells at Jullundur, Phillour and Mahatpur.

Twenty-four new portable latrines were constructed last year at Jullundur. From the past three years' experience it is found that this innovation has proved a success, as it is convenient for the public as well as for manuring the fallow-land on which the latrines are placed.

The slaughter-house for sheep and goats at Jullundur which was formerly in an enclosed ground has been reconstructed on an improved plan, like that of the cantonments.

Under the head of "Paving" there was an expenditure in all the Municipal towns except one, *viz.*, Kartarpur. Jullundur spent Rs. 1,058, Phillour Rs. 1,448, Nakodar Rs. 597, Mahatpur 519.

KANGRA.

The Municipalities in this district are very poor, the only work constructed during the year being a pucca drain in the Dharmsalla Lower bazár at a cost of Rs. 168.

AMRITSAR.

Drainage improvements.—The main drain is 12,220 feet long, of this 10,187 feet have been constructed, and 8,600 plastered with Portland cement.

The road round the city follows the line of the main drain under construction for a length of 8,500 feet; the earth-work and metal consolidation has been completed.

The escape channel beyond the junction of the east and west main drains is 28,000 feet long, of this 24,700 feet have been finished, 2,950 in progress and 350 still untouched. Two large bridges over this channel have been constructed, as also two bridges over the city ditch.

For the flushing of the main drain, a masonry aqueduct and regulator at the point where the Hasli canal enters the city have been constructed, and the embankment and raising of the bed of the canal are nearly finished. Some considerable progress has been made in adjusting the internal drainage with the main drain.

The sewage that till recently flowed from the clock tower past the Town Hall through the Kaisar Bágh, has been diverted towards the Sultanwind gate into the main drain. Infalls have been constructed to the Bhagatanwalla, Gilwali, Sultanwind and Chatiwind gates through which the sewage now discharges into the main drain.

In connection with the main drainage scheme, though not included in it, may be mentioned the construction of a rajbaha to convey canal water through 3 public bathing-tanks to the main drain. This rajbaha is 6,800 feet long and is supplied direct from the Bari Doáb Canal. Beside the public benefit to the people having pure water to bathe in throughout the year, the tanks will be useful for the storage of water with which to flush the main drain during the time the Bari Doáb Canal is closed for annual repairs.

A water channel from the Hasli to the Rámsur and Babuksur tanks outside the city has also been constructed. This channel runs inside the city-wall direct to the tanks named. Formerly these tanks received water through the Prutumsur tank, that is to say, the overflow of the Prutumsur passed into the street drain, which also carried sewage, and then into the Babuksur; the overflow of the latter finding its way through a kucha channel to the Rámsur. By the time the water got to the Rámsur, it resembled pea-soup more than anything else. This has now been changed and these tanks will receive pure canal water.

The above are the more prominent works of improvement effected during the year. The ordinary amount of street and drain repairs were executed; these need scarcely be detailed.

Conservancy.—The right to sell the city sweepings was sold to a contractor for Rs. 26,250. Formerly the committee through its own establishment sold the manure. In addition to this item Rs. 1,875 were realized for the sewage. This is used by the zamindárs for irrigating their fields, and, as may be judged from the high price realized, is much appreciated. Rs. 405 were paid for the sweepings of the civil lines. Total Rs. 28,530, or an increase of nearly Rs. 5,000 on previous years.

Minor Municipalities.

In Tarn Táran two new roads were constructed and the street drains were repaired; the main street of the town Majitha was paved and drained; outside the town of Jandiala trees were planted and the construction of a metalled road from the Grand trunk road to the town was put in hand; the street drains were also repaired. In Rámdas ordinary repairs only were executed, and the manure of these Municipalities is now a marketable commodity, that of Jandiala sold for Rs. 175, Majitha for Rs. 300, Tarn Táran for Rs. 975, Vairowal for Rs. 40, and Rámdas for Rs. 50.

GURDASPUR.

Gurdáspur.—Repairs done to pavings and Sadr Bazár roads.

Dinanagar.—Paving of nine streets; constructing a drain at Taragarh gate; Repairs to paving of streets and drains, and to a tank.

Kalanaur.—Petty repairs to pavings.

Behrampur.—Do. to gates in progress.

Pathankot.—Paving of certain streets, and repairs to streets and drains.

Narot.—Building of 3 bridges in the Municipal limits commenced.

Sujanpur.—Paving of two streets in progress, and repairs to a Baoli.

Batála.—Repairs to steps of Shumshere Khanwala Tank and to a portion of the town wall. Paving of 4 streets, and construction of a drain and a slaughter-house. Repairs to streets and drains.

Dera Nanak.—Construction of two bridges within Municipal limits.

Fatehgarh.—Repairs to paving of streets and to a tank from District fund. Repairs to two wells.

Shahpur.—A tank, the estimated cost of which is Rs. 2,091, is being constructed.

Sukhuchak.—Petty repairs to pavings.

Darman.— Ditto ditto.

Kot Naina.—Repairs to a well.

With regard to the improvement of village sites in this district, the Deputy Commissioner states "that no village committees have been appointed in the district to superintend the arrangements, but officers, when visiting the interior of the district, satisfy themselves that such arrangements are not neglected. Attention is paid to the cleaning out of wells, the removal of noxious vegetation and collection of refuse at convenient spots; zaildárs and headmen are expected to use their personal influence in such matters, and some do so. At Dera Nanak the members of the Municipal Committee look after the sanitary arrangements of the neighbouring villages. In Pathankot Táhsil, zaildárs and lambardárs are instructed to keep the villages clean, as far as it is possible to do so."

SIALKOT.

Drainage.

Three drains or sewers in the city of Siálkot, a drain in the Jamki municipality and some in other towns repaired.

Water-supply.

Wells in the Siálkot town were repaired and a new one is now being sunk.

Roads.

Metalling a road through the city of Siálkot from Tibba Sadhan to Sheikh Soudagar's Serai, also the circular road from Tibba Sadhan through the main bázar on to the large bridge over the Aik.

Pavements.

Pavements of bazárs and bridges in the town of Siálkot and other Municipalities were renewed and repaired, as far as funds would allow.

Zaildárs have been appointed to see to the cleanliness of the villages in their circles.

LAHORE.

The sanitary improvements executed during the year by the several municipalities in the district are as follows:—

		Rs.
Lahore.	Akbari latrine	1,628
	New latrine outside Sultan serâi	1,974
	Kutcha latrine at Menagerie	30
	Petty repairs to latrines	56
	Repairs to paving in the city	305
	Repairs to city and station roads	35,670
	Repairing and constructing drains	2,675
Kasur.	Repairs to paving	501
	Repairs to streets and town roads	776
	Tank at Kasur	478
	Latrines	52
	Repairing and constructing drains	443
Chunian.	Ditto streets and town roads	295
Khemkarn.	Ditto ditto	66
Patti.	Ditto ditto	70
Sharakpur.	Ditto ditto	32
	Repairing and constructing drains	60

The amount spent on the repairs to city roads was most trifling, *viz.*, Rs. 978 only, in comparison with Rs. 34,692, spent for the repairs of the station roads.

FEROZEPORE.

In Ferozepore Rs. 694 were spent on paving, Rs. 4,757 on roads and bridges, Rs. 4,890 on drainage and sewerage, Rs. 3,006 on water-supply, including clearing and repair of wells, tanks, &c. In Mukhtsar Rs. 125 on roads and bridges, in Dharmkot Rs. 57 on repairs of latrines, and in Zerah Rs. 66 on drainage or sewerage.

GUJRANWALA.

In Gujránwála no sanitary work of importance was undertaken during the year. Rs. 500 were expended in metalling the grain market, Rs. 1,451 were spent upon improving city roads, and Rs. 1,291 on repairs to pavements. In Wazirabad town, the two important sanitary works mentioned in last year's report, *viz.*, the construction of a drain leading into a stream known as the "Palku Nulláh" and the remetalling of the new bazárs, remained unfinished at the close of the last year. The drain is now completed and will considerably improve the drainage of the town. Another measure of sanitary improvement noticed in last year's report, *viz.*, the removal of the Hindu burning-ground from the Palku stream, has also been carried out during the year.

In the minor towns the necessary repairs to pavements were executed as usual.

RAWALPINDI.

Drainage.

The main sewer of the city of Rawalpindi (from Circular Road to Majbis garden) was furnished with a pucca pavement at a cost of Rs. 3,918. The excavation of the big drain throughout was done.

The old masonry work of the big drain at Bazár Raja and Mohalla Shirajan was repaired at a cost of Rs. 1,052. The small drains were repaired.

Water-supply.

An experimental well for the town of Rawalpindi was sanctioned. Excavation to the water-level was made and a pucca cylinder to the height of 18 inches done. There was another well dug, named Meah Mundah, but it was a failure, as no water was found on excavation; 35 wells and one tank were cleaned during the year, and 3 new wells were constructed.

Other sanitary improvements.

Circular and Chuhar Roads were metalled at a cost of Rs. 1,250 and 4,750 respectively.

Hazro.

	Rs.
Sydpur Road	256
Road in front of Government garden ...	1,293
Shalditta Road	244
Metalling approaches to Seh bridge at a cost of ...	4,000
Paving street of Hazro town	1,000
Enlargement of school-house	620
24 gates	2,196
Circular Road was repaired at a cost of ...	1,614

JHELUM.

Drainage.

A number of drains were constructed in the municipal towns, and due attention paid to their cleanliness.

Water-supply.

Cleaning of the wells is duly attended to in the district, and the water is good and sufficient.

GUJRAT.

Drainage.

No works have been undertaken in any of the municipalities of this district. Repairs have been executed to certain drains in the town of Jalalpur, costing Rs. 200, during the year.

Water-supply.

No new work undertaken under this head. Rs. 258 have been spent in clearing wells and in repairs to tank at Gujra, Rs. 58 in clearing out and repairing wells in the Kunjah municipality, Rs. 30 ditto at Dingah.

SHAHPUR.

Drainage.

Drains and sewers were kept in good repair in all the municipal towns. A sum of Rs. 595 was expended in repairing drains at Sahiwal.

Water-supply.

Tanks and wells were repaired in the towns of Bhera and Sahiwal at a cost of Rs. 86 and 68 respectively. A cut is being excavated with a view to bring water from the Corbynwah canal to the town of Khushab to facilitate supply of water for drinking purposes and for flushing drains and sewers. Rs. 200 have been laid out during the year under report, and the work is in fair progress.

Latrines.

Latrines for the town of Bhera and Girot were repaired during this year at a cost of Rs. 100 and Rs. 28 respectively. Rs. 500 were expended in metalling roads of the town of Miani, and an expenditure of Rs. 481 was incurred on repair of roads in the following municipal towns:—

	Rs.
Bhera	147
Sahiwal	230
Khushab	41
Total ...	418

Other works.

The only work on which expenditure was incurred under this head is paving streets in the larger towns of the district, *viz.*—

	Rs.
Bhera	712
Miani	135
Sahiwal	275
Khushab	1,127

JHANG.

The following sanitary improvements have been effected during the year:—

(1). Some streets have been paved in Maghiána, Jhang and Shorkot,

(2). Repairs have been made to roads and bridges at Maghiána.

(3). A new drain has been constructed at Maghiána.

MONTGOMERY.

Montgomery. Construction of three sets of latrines at a cost of Rs. 299.

Kamalia. Pucca drain to convey water to school compound and dispensary garden.

Pak Pattan. Construction of a drain to carry out the town filth and sluice water Rs. 25. Pavement of a street Rs. 117-1.

Drainage. During the year under report, the drains at Montgomery have been repaired, and a new one has been constructed at Pak Pattan.

MUZAFFARGARH.

Drainage. Side-drains in the street pavements were made in all the municipal towns except Khangarh. In the latter town two very necessary drains were sanctioned after the close of the year.

Water-supply. The municipal towns are too small and their income is not yet sufficient for the introduction of any improved system of water-supply. The wells in each town were cleansed and as funds become available they are protected by the erection of masonry copings from pollution. Most of the wells in Alipur are thus protected, and during the present year the protection of the wells in Muzaffargarh will be completed.

Other improvements. Other sanitary improvements were, paving streets, and filling up hollows. A large cavity near the town of Alipur which was always full of stagnant water was filled up at a cost of Rs. 400. Estimates for metalling the circular road round the town of Muzaffargarh, and for paving streets in Alipur, amounting to Rs. 931 and Rs. 230 respectively, have been passed and the work has been commenced. The circular road round the town has been planted with trees.

DERA GHAZI KHAN.

The sanitary works executed were—extension of drains in the city, repair of drains constructed in previous years, construction of culverts and bridges, and cleaning out of wells.

BANNU.

Edwardes-abad. Sanitary works have been progressing. In Edwardes-abad the pavement of the streets with bricks has been continued, and it is hoped in the present year that this work will be completed almost throughout the entire city, the roads being thus made convex with pucca drains on each side; the drainage, concerning which there has never been much difficulty in Edwardes-abad, has been yet more simplified. The wells in the city have been cleaned out by laborers brought up from Dera Ismail Khan for the purpose. The slaughter-house is being paved. The amounts expended in the street improvements are as follows:—

Pavements, Kotwali road to Mirian Gate, Holvid Bazár to Akbari Gate, Rs. 4,791. Besides the above a kutcha tank was dug out at the Mirian Gate at a cost of Rs. 100. Mirian Gate constructed at a cost of Rs. 600, pucca urinal at a cost of Rs. 69.

In accordance with suggestions of the Sanitary Commissioner, arrangements for the improvement of the drain near the Parade Gate have been made which will no doubt answer. The costs of the improvements are to be borne by the shop-keepers and committee in proportion of 2 to 1, and the cost will be about Rs. 1,000 or Rs. 1,200. His observations regarding the shape of drains, &c., are regarded in new works, and drains which ran through private houses have now been mostly got rid of.

PESHAWAR.

Drainage. Twenty-two drains, mostly saucer, are stated by the Deputy Commissioner to have been made in the different parts of the town.

Water-supply. The pipes for the Bara water-works have been received by the Executive Engineer, Military Works, to some extent, and have not yet been laid. Better water is, however, brought into Cantonments as the masonry works are used now, and water does not, as before, come in a big open drain all the way from Bara itself. The difference, although not much, is, of course, appreciable. The improvement of the city canal was found to be such a good work in every way, that it was gone on with, and there is no doubt that besides beautifying the town, and doing away with what was really an eyesore, it will serve all the purposes for which it was intended, being at the same time a work which can easily be made to adapt itself to the cantonment system of water-supply, which, it is hoped, will be eventually extended to this town. Three large wells have been made during the year, both for drinking purposes and to use for water-supply in case of fires. Pumps have been sent for from Rurki for these wells.

HAZARA AND KOHAT.

No sanitary works were executed during the year.

SECTION X.—GENERAL REMARKS AND PERSONAL PROCEEDINGS.

Summary of personal proceedings.

105. As stated in Section X, page 95, of my Sanitary Administration Report for last year, the duties of this office were conducted by Surgeon-Major Adam Taylor, who was appointed to officiate for me in September 1879, during my absence on special political duty in Afghanistan under the orders of the Government of India, Foreign Department, and he held the appointment till the 31st March 1880. I resumed charge of the office on the 1st April, and its duties have been conducted by me since that date.

The orders of the Government of India, contained in Resolution No. 150 of 15th March 1880, amalgamating the Vaccination with the Sanitary Department, came into force from the 1st April 1880, and Surgeon-Major J. Bennett, who was officiating as Superintendent General of Vaccination, was appointed a Deputy Sanitary Commissioner under the orders of the Sanitary Commissioner.

But the scheme for the re-organization of the Vaccine Department, in consequence of this transfer, which I submitted to Government in June last, not having met with the full concurrence of the Punjab Government, His Honor the Lieutenant Governor consented to my proposal that the Vaccine Department should be allowed, under the circumstances of the case, to continue its operations as heretofore during the then ensuing cold season, and Dr. Bennett therefore continued to officiate as Superintendent General of Vaccination for another year.

In November 1880, Surgeon-Major G. Massy also was appointed a Deputy Sanitary Commissioner, and was engaged exclusively in vaccination work in the districts comprised in the western circle of the Province.

I was out in camp on my cold weather tour from 23rd November 1880 to 19th February 1881, and I give below a statement showing the number of towns and villages inspected by me, and by a few Civil Surgeons in their respective districts. A summary of those only marked with an asterisk is given further on in this Section of the Report.

List of Inspection Reports of towns and villages inspected by SURGEON-MAJOR H. W. BELLEW, C. S. I., *Sanitary Commissioner, Punjab, from October* 1880 *to March* 1881.

District.	Name of town, village, or rural circle inspected.		Date of inspection.		
Ludhiána	*Ludhiána	T.	October	16th, 17th, and 19th	1880
Simla	Kalka	V.	November	3rd, 4th, and 5th	„
Amritsar	Amritsar	T.	October	19th and 20th	„
Siálkot	*Siálkot	T.	March	21st and 22nd	1881
	Lahore T. and Mayo Hospital		October	26th, 27th, and 28th	1880
Lahore	*Chung	V.	November	23rd	„
	*Manga	V.	Ditto	24th	„
	Dehra Bhai Pheru	V.	Ditto	26th	„
Gujránwála	*Wazirabad	T.	March	23rd	1881
	*Gujránwála	T.	Ditto	25th	„
Mooltan	*Tulamba	T.	December	6th	1880
	Sarai Sidhu	V.	Ditto	8th	„
	*Kadirpur Rama	V.	Ditto	10th	„
	Mooltan	T.	Ditto	14th and 15th	„
Jhang	*Shorkot	T.	Ditto	7th	„
	Athara Hazari	V.	February	12th	1881
	*Maghiána *cum* Jhang	T.	Ditto	14th	„
Montgomery	*Gogaira	V.	November	29th	1880
	Harappa	V.	Ditto	1st	„
	Muhammadpur	V.	Ditto	1st	„
	Chichawatni	V.	Ditto	2nd	„
	Kot Kamalia	T.	Ditto	3rd	„
Muzaffargarh	*Muzaffargarh	T.	December	17th	„
	Shahr Sultan	T.	January	12th	1881
	*Khangarh	T.	Ditto	10th	„
	*Alipur	T.	Ditto	14th	„
	*Sitpur	T.	Ditto	15th	„
	*Jatoi	T.	Ditto	17th	„
	Rohilanwali	V.	Ditto	19th	„
	Mahamúd Kot	V.	Ditto	25th	„
	Sanawan	V.	Ditto	26th	„
	Kot Addu	V.	Ditto	27th	„
	Dara Din Panah	V.	Ditto	28th	„
Dera Ismail Khan	Kot Sultan	V.	Ditto	29th	„
	*Layah (Leia)	T.	Ditto	30th	„
	*Karor	T.	Ditto	31st	„
	Bihal	V.	February	1st	„
	Jhirkil	V.	Ditto	1st	„
	*Bhakkar	T.	Ditto	2nd	„
	*Dera Ismail Khan	T.	Ditto	4th and 5th	„
	Mankera	V	Ditto	9th	„
	Hydrabad	V.	Ditto	10th	„
Dera Ghâzi Khan	*Dera Ghâzi Khan	T.	December	20th and 21st	1880

T. denotes town, and V. village.

List of towns and villages inspected by Civil Surgeons from September 1880 *to* 31*st March* 1881.

District.	Name of town, village, or rural circle inspected.		Date of inspection.		
Karnál (Officiating Civil Surgeon Badha Kishen)	Kaithal	T.	October	3rd	1880
	Budlada	V.	Ditto	16th	,,
	Kunjpura	T.	Ditto	26th	,,
	*Karnál	T.	November	not given	,,
	*Panipat	T.	Ditto	28th	,,
	*Asand	V.	December	20th	,,
	Baror	V.	January	22nd	1881
	Dhatrat	V.	February	6th	,,
Hissar (Civil Surgeon, Surgeon Major M. Cooper)	Hissar	T.	(Not given)		
	*Bhiwáni	T.	(Not given)		
Sirsa (Officiating Civil Surgeon, Fateh Singh)	Rania	T.	January	22nd	1881
	Ellenabad	T.	Ditto	,,	,,
	Gunga	V.	March	9th	,,
	Kharian	V.	Ditto	,,	,,
	Rassalia	V.	Ditto	,,	,,
	*Sithu Gamoo	V.	Ditto	10th	,,
	Chautalah	V.	Ditto	,,	,,
	Aboob Shahr	V.	Ditto	11th	,,
	Sohowalla	V.	Ditto	12th	,,
	Punniwala	V.	Ditto	,,	,,
	Panihari	V.	Ditto	27th	,,
	Furwaeen	V.	Ditto	,,	,,
	*Rori	T.	Ditto	28th	,,
Umballa (Civil Surgeon, Surgeon Major R. Bateson—now on furlough)	*Sadháura	T.	February	7th & 8th	1881
	Jagádhri	T.	Ditto	10th & 11th	,,
	*Thanesar	T.	Ditto	14th	,,
	*Umballa	T.	Ditto	22nd to 25th	,,
	Shahabad	T.	Ditto	16th	,,
Jullundur (Civil Surgeon, Surgeon Major J. C. Penny M. D.)	Goheer	V.	September	16th	1880
	*Nakodar	T.	Ditto	,,	,,
	*Nur Mahal	T.	March	31st	1881
Gurdáspur (Civil Surgeon, Surgeon Major Geo. Thomson, M B.)	*Fatahgarh	T.	December	23rd	1880
	*Dinanagar	T.	Ditto	27th	,,
	*Bahrampur	T.	January	10th	1881
	*Kalanaur	T.	Ditto	13th	,,
	*Batala	T.	February	17th & 18th	,,
	*Srigovindpur	T.	March	31st	,,
Gujránwála (Civil Surgeon, Surgeon Major R. Quinnell)	Jabraon	V.	September	29th	1880
	*Shekopura	T.	October	1st & 2nd	,,
	*Batalla	V.	Ditto	27th	,,
	*Eminabad	T.	November	20th	,,
	*Killa Meah Singh	V.	Ditto	29th	,,
Gujrat (Civil Surgeon, Hony. Surgeon Major J. R Deane—since transferred from Jullundur to Gujrat District)	*Jalalpur	T.	January	21st	1881
	Baror	V.	Ditto	22nd	,,
	Karianwala	V.	Ditto	,,	,,
	Daulatnagar	V.	Ditto	30th	,,
	Kotta	V.	Ditto	31st	,,
	*Kunjah	V.	February	10th	,,
	Phalian	V.	Ditto	11th	,,
	*Mangowal	V.	Ditto	12th	,,
	*Dingah	T.	March	23rd	,,
	*Mung	V.	Ditto	25th	,,
	Chak Vasava	V.	Ditto	26th	,,
	Sahidwali	V.	Ditto	,,	,,
	Matawala	V.	Ditto	27th	,,
	Dulawala	V.	Ditto	,,	,,
	Chachee	V.	Ditto	,,	,,
Jhang (Officiating Civil Surgeon, Rai Bahadur Chetan Shah)	Kot Isa Shah	V.	November	11th	1880
	Maghiána	T.	Ditto	23rd	,,
	Jhang	T.	Ditto	23rd & 24th	,,
	Dab Kalan	V.	December	10th	,,
	Ahmadpur	T.	Ditto	12th	,,
	*Garh Maharaja	V.	Ditto	13th	,,
	Bhowana	V.	Ditto	23rd	,,
	Chaniot	T.	Ditto	25th	,,
	*Wara C Thatta Muhammad Shah	V.	Ditto	27th	,,
	Bhan	V.	March	6th	1881
	*Kot Isa Shah	V.	Ditto	7th	,,
	Shahjiwana	V.	Ditto	9th	,,
	Shorkot	T.	Ditto	30th	,,
Montgomery (Civil Surgeon, Mr. R. Crossley).	*Pakpattan	T.	February	11th	1881
Kohát (Civil Surgeon, Surgeon B. B. Bookey)	*Kohát	T.	January	23rd & 24th	1881

Dialogue with the people on matters relating to sanitation described.

106. I here briefly describe the method of my procedure in these village inspections as a guide to the Deputy Sanitary Commissioners and Civil Surgeons, so as to ensure uniformity in the work of sanitation, and in the instruction of the people in the principles and practice of domestic hygiene.

I start with the assumption that the very faulty and unwholesome conditions of sanitation under which the people live are the consequence of ignorance rather than of wilful carelessness or neglect, and give them credit for naturally preferring cleanliness to filthiness in their modes of life and domestic arrangements.

I then proceed to point out how far the existing faults and evils are the results of ignorance concerning their injurious effects upon health and personal comfort, and how far they are remediable and altogether avoidable by the adoption of very simple measures which are applicable by the people themselves. And I conclude my inspection with an address to the people in simple and friendly language, in which I point out the most important matters which call for their attention as being conditions very injurious to their personal comfort and health, and as being evils, the remedy of which lies in their own hands. The following account of the inspection of one village will serve as a sample of the procedure followed in the inspection of rural circles generally.

On arrival at a village I send the *chaprassi* (or messenger in attendance on me from the collectorate) to summon the *lambardárs* or headmen, and, briefly stating the object of my visit, inform them that I shall be glad to meet all the principal residents and householders to explain to them the results of my inspection. At the same time I give directions for the *chokidárs* or watchmen to be summoned and to bring their memorandum books of births and deaths with them, and also to collect the children who have been vaccinated, for my inspection. In a few minutes I have most of the headmen and householders assembled about me, and with them proceed on a tour of the village lanes, and courts, and the ground about the outskirts, stopping now and then to point out defects and their remedies. I then assemble all at the school, or under a tree, and hold a conversation on sanitary matters.

The lambardárs being on either side and immediately about me, I enquire whether there is any sickness in the village at present. The reply from several voices is usually somewhat to this effect—" No ; by the mercy of God there is no sickness, only a case or two of small-pox, and a few people down with fever. We are generally free from much sickness, except when the rain comes, and then we have fever in almost every house. The worst time is in the autumn when the season changes and strokes of chill (*sadma garm sard*) are common. Many are at such times carried off by death, and sometimes the whole village is prostrated with fever for weeks or months together."

But you are generally free from sickness, I observe, when the weather is dry ?

" Yes ; we have no sickness to speak of, except after falls of rain, and worst of all when the season changes in autumn," is the usual reply.

Has it ever occurred to you to try and explain this circumstance, or to take any step to remedy the losses and inconveniences you suffer from this sickness, which, you say, follows upon falls of rain, and kills many of your community and often prostrates the whole village for weeks or months together ?

" How should we ? We are God's creatures and in His hands. God is almighty and His ways are inscrutable. He provides for and cares for us."

Quite true. We are all God's creatures and in His hands. But let me ask you, is that any reason why you should neglect to provide for your worldly welfare when it is assailed by unnatural causes produced by yourselves and capable of remedy by yourselves ?

" God only knows. The *Sirkar* (Government) is very beneficent to us poor subjects, and you are all very wise. Perhaps you will tell us."

Well what I mean is this. Unless you exert your intelligence and act for yourselves in matters relating to your health and bodily well-being, as I see you do exert your intelligence and energies in the matters which concern your worldly welfare in other respects, you cannot expect to escape from the injury done to your health by the evils your own acts produce and which you take no means to avert. For instance, the house you live in did not grow up and assume its form of itself ; it was built by labour and on a previously thought out and arranged plan. And when it becomes damaged by rain let us say, you at once take measures to repair the damage done and to protect it against a like injury again by arrangements for the diversion of the water. Similarly the bread you eat does not come to you of itself all ready cooked. On the contrary you have to exercise your intelligence and energies to prepare the soil, sow the seed, harvest it and grind it before you can use it as food. And when the crops suffer from any preventible causes you are not backward in exerting yourselves to prevent the mischief, or to remedy it, arising from those causes. Were you to neglect on such occasions to exercise your intelligence and energies to avert the evils arising from such accidental occurrences, you know how you would suffer for want of shelter and food. Do you understand my meaning ?

" Of course we do. If we did not look after our houses and crops they would soon go to the bad."

Precisely so, this is just what I wish you to understand regarding your health. If you do not look after your health more than you do now, you cannot expect to escape from the losses and sufferings you undergo whenever sickness falls upon you. I know your sufferings in this respect are more the results of ignorance as to what it is necessary to do to avert sickness than of wilful neglect, for nobody willingly subjects himself and those dear to and dependent on him to miseries and losses which may, to a great extent, be prevented by forethought and care. And this is the reason I wish to explain to you, as it is my official duty to do, the means by which, with the exercise of your intelligence and energies, you may, to a great extent, preserve your health from the losses and damage it suffers now whenever sickness is abroad in the air; and also to point out to you the very faulty conditions which in this village tend to increase sickness and death whenever they come this way.

" This is very kind of you. Pray go on. We are interested in what you say."

Very .well. I will begin at the beginning so that you may understand for yourselves, and not rely on my words further than they recommend themselves to your reason.

. " Why say so? We will accept all you say and be guided by your commands, for what do we know about it."

But this is not what I want, and there is no command in the matter. If there was, I should set about and effect the necessary improvements in this village without further ado. What I want is that you, yourselves, should understand what are the principal requisites for maintaining sound health, and what are the means at your disposal for doing so. I wish you to reason out the matter for yourselves and to act for yourselves, for unless you do so, nobody else is likely to do so for you.

" Very well, Sir. We are ready to hear and be guided by you."

Then listen. The first great and universal essential of life is air, and of healthy life, pure air. Mankind to live must breathe it, whether sleeping or waking, from 16 to 20 times every minute. You all know that to stop the breathing of air very quickly brings death. And you should know that when the air is mixed with impurities, whether these be or be not of themselves injurious, you at each breath get less than the proper amount of pure air, which is the only air fit for the purposes of the body. The air we breathe is naturally pure and in nature maintains its purity by the action of winds. Whenever men are crowded together, as in towns and villages, with their domestic cattle and animals, and their various industrial pursuits, there arise a multitude of causes which operate to impair the purity of the air. This pollution of the air is more intense in large cities and towns, enclosed within high walls, than in the smaller and more open villages in the rural districts; and its effects are distinctly marked upon the residents of cities who present an inferior physical development in comparison with the residents of villages, a fact which is familiar to you all.

For the maintenance of sound health pure air is essential, and the greater the impurity of the air the greater the impairment of sound health. You will understand this better by a simple and familiar illustration. Let us suppose that the amount of food requisite to keep one of these men, say this fine, handsome fellow—what's your name? Gamah, very well, to keep Gamah in robust working strength, fit for his daily field work, is a sér of pure wheat meal and a sér of pure milk. Now if I replace half a sér of the meal with the same weight of earth and half a sér of the milk with a like quantity of water, and then give the two to Gamah as the full amount of his usual daily ration of food, it is evident that he will in reality be reduced to the half of this usual food ration, and that his strength which was maintained on the full allowance will diminish in proportion. The earth and the water which here rendered the meal and the milk impure may or may not of themselves act injuriously on the man's health according to the nature of foreign substances that may have been mixed up in them before they were added to the man's food. But the main point I wish you to remember is, that the addition of these matters to the food reduced its actual amount and that the man suffered a partial starvation, and consequently a proportionate loss of strength.

Now the same thing happens when the air on which we live is mixed or diluted with other matters, which are usually invisible to the sense of sight and not always perceptible to the sense of smell. That is to say, these other matters, be they or be they not of themselves directly injurious to health, reduce the actual quantity of pure air taken in with each breath, and thus deprive the body of its natural and proper supply of that essential of life, and consequently impair the natural strength of the body which, as in the case of Gamah, whose food we diminished by adding earth and water, is reduced to a state of partial starvation of air, of pure air, which, unlike ordinary food which may be taken into the body only two or three times in the 24 hours, is required to be breathed many times in every minute, continuously through life. You will understand now the great importance of pure air and plenty of it as a prime requisite for maintaining the body in a state of sound health.

" Yes, this is plain enough and reasonable. But, Sir, we poor people get accustomed to this bad air and don't suffer any inconvenience from it as you do who live in big houses and well-kept surroundings."

My friends, that is just the mistaken notion I wish to drive out of your minds. As a fact, and this I will prove to you presently, you do not get accustomed to bad air any more than a man gets accustomed to starvation, and you do feel inconvenience from it every bit as much as the starved man from the reduction in the ration of his food, although the facts are not so clearly recognized by you, since you have no knowledge of your vital statistics.

" Well, Sir, we have always lived as we do now and our forefathers before us. In their time, indeed, nobody thought of these things and our villages were much more filthy than they are now. Indeed since the establishment of the Queen's Government we are more carefully looked after and many improvements have been effected in our condition of life, and our villages are cleaner than they ever were."

I am glad to hear what you say, but at the same time I must tell you plainly, this village of yours is nothing like the state of cleanliness it should be in, nor have you yet done a tithe of what you can do if you choose to make it a very much more pleasant and wholesome place than it is.

" Well, Sir, if you will tell us what to do we will be guided by your instructions, for we know what you say is for our good."

Well then, I was saying just now that pure air and plenty of it was the prime requisite for maintaining the body in sound health. I will now mention to you some of the ordinary and constantly operating causes which tend to pollute it by your mode of living, and point out the simple means by which this pollution of the air you breathe may be prevented or reduced to a minimum.

And first, with respect to the houses you live in. You saw just now when I went with a few of you into that house over there, which is like most of the others in this village, what were the defects I pointed out to you. I refer to the Zamíndár's house in which we found the cattle stalled under the same roof with the family. You will remember that when I had the door closed we were in entire darkness, and could not distinguish the inner chambers which were crowded with field implements, sleeping cots, corn bins, and stores of fodder, nor even see the mangers to which the cattle were tethered though only a few paces off. You will remember also how close and offensive the air of the room became, though we were in it only for a few minutes, and that when we came out into the open air I explained to you the causes and the remedies of that stifling and stinking air. You said that the cattle were housed inside with the family only during the winter months and that the door was only closed at night time. But I told you that was nothing to the point. What was required was a ventilator in the wall of each room under the roof, or in the roof itself, over each room, so as to allow of a free flow of air through the whole house, and I explained to you why this was necessary.

Air, I told you, like food and drink, when once taken into the body became used up by the body for its own purposes and was then voided from the lungs as effete matter, just as were food and drink from the bowels and bladder; and that the breath so voided was no more fit to be respired or breathed again than were those other evacuations fit to be ingested or eaten again. As long as there was no obstruction to the access of fresh air from outside, this effete and used up air when given out from the lungs rose by its lighter weight and was carried away through the ventilators and dissipated in the general atmosphere by the current of incoming fresh air, and no inconvenience resulted, as the ventilators served to keep up a constant current of fresh air from outside. On the other hand, where the access of fresh air was obstructed by absence of any means of ventilation, the occupants of the house, men and animals, were driven to live upon the effete air they were one and all continually giving out during the time they were shut up together.

And I impressed upon your attention the fact that, however little inconvenience might be experienced at the time from breathing such effete air owing to the reviving effects of the fresh air breathed on coming out, the practice of thus every day for several hours together subjecting the body to repeated doses of such effete and polluted air could not be long persevered in, without in the end seriously impairing the normal state of the bodily health ; and I mentioned as a case in point the inferior physique of city people, whose condition of life subjected them to a more constant and exaggerated form of this evil as compared with country people who were less crowded together. The remedy for it is free ventilation, and also the housing of the cattle under separate roofs. But the provision of ventilators is indispensable to a supply of fresh air inside your houses.

" But, Sir, many of our better class of houses are already provided with ventilators, and there is no difficulty in the way of providing them in every house of the village. What you have said is perfectly reasonable and for our good. We will recommend everybody to make ventilators in their houses. As to the cattle living under the same roof with the family, this is more a matter of necessity than of choice. Most of us who can afford to do so, already keep our cattle under separate roofs."

So much the better. It is no ways suitable for man and beast to consort together as is too generally the case in this country, especially with the want of ventilation I have just drawn your attention to. Your cattle cannot tell you when they are ailing or ill, nor can they complain of the cruel oppression you inflict upon them. When, as I have so many times seen, you tether the head of one animal close to the tail of another, you little think of the cruelty you inflict upon the former through the droppings of the other close to its nose the live-long night through.

" What you say is true. We cannot deny it. You put us to shame. We will try and mend the matter."

It will be to your own advantage if you do so. For the injury you inflict upon yourselves by the present practice is of a twofold kind. In the first place by ill-treating your cattle in the way you do, that is crowding them together at night in a confined and ill-ventilated space, which is seldom properly cleaned, you subject them to severe hardships which very seriously damage their good condition, as is evidenced by their rough staring and sometimes mangy coats, and their weak and lean bodies. In this condition your cattle lose not only their market value but also their working power, which means that you yourselves lose in money as well as in their produce and labour. In the second place, by living in the same room with your cattle you expose yourselves not only to all the unwholesome exhalations from their bodies and evacuations, but also to the contagion or infection of any disease they may be suffering from. In several places where I have found cattle in the houses dying from murrain, I have at the same time found members of the family dying from a similar disease. And from what I have heard, parallel instances are known to many of you in this village. This is a very important subject and requires your serious attention. You should lose no time in providing separate accommodation for your cattle.

"Yes, we quite understand all you have said, and acknowledge its truth. Your words are not without effect. We will pay attention to them."

I hope for your own sakes you will abandon this always unwholesome and oftentimes dangerous practice of living with your cattle. If you don't, only you yourselves will be the direct and immediate sufferers.

"We will do so, Sir. It is to our advantage that we should sleep apart from our cattle."

Very well. Now so far I have only explained to you one of the most common ways in which the air of your houses, the air upon which for many hours in each night and day you are dependent for breathing, is polluted and rendered unfit to support life in a condition of sound health. And I have told you the simple remedy. Namely, the provision of a ventilator for each room in every house. I must now draw your attention to another very common way in which the air of your village is polluted, and this is a very important matter, because the air of the village is the air which supplies your houses and is the air on which you are all dependent for breathing at all times night and day so long as you live in the village. You will remember that a while ago when going over the village I drew your attention to the heap of cattle dung, litter and filth of sorts which we found in the courts and alleys and all round the outskirts of the village, and that I then said I would speak to you more particularly about these later on when we had finished our inspection.

"Yes. And we told you that we kept the stuff as manure for our fields, and that it was carried away to our wells at each ploughing season."

I know you did; and I told you that I was fully aware of the value of the stuff as a manure, but that the village was not the place to store it in, nor was your method of storing it a good or economical one. I asked why you put the stuff in your fields as manure, and you replied "because it strengthens the soil and increases our crops."

I then told you that as it strengthened the soil and increased your crops when thrown on the fields at the proper season, so also at the proper season it strengthened the air for the increase of sickness when thrown on the surface all about your village.

"Very true. That is what you said. But our sickness only comes in force after rains, and this stuff in greater or less quantity lies in our village all the year round."

I know it does, and that is what I wish now to draw your attention to. Because I wish to point out to you the evil consequences of storing the stuff in your village at all. But first, I must tell you that these evil consequences are most strongly developed only in the proper season. You have told me repeatedly that your sickness, that is to say, your severe sickness and mortality come only after rain falls. Such occasions then are the proper season for the activity of this manure stuff in increasing sickness. And this I will now explain to you.

"Yes, our great sickness and mortality only comes after rain, and most severely after the hot weather rains, when the whole air of the village becomes sensibly changed and perceptibly foul."

This is just what I wish to speak to you about, because I see you have never thought of the matter with the view of connecting cause with effect. In fact, a while ago, when I pointed to that young woman who was sweeping her court and tidying the house, I asked you why she took all that trouble. You replied "because people liked to have their houses nice and clean, and tidy." I then told you that was a capital answer, and that it satisfied me that the filthy state of your village was more the consequence of ignorance than of wilful negligence. You remember we stood a moment to see what she would do with the stuff she had swept together, and we saw her collect it in a basket and carry it to the corner of the courtyard and there chuck it over the wall. I took you all round to the spot, and there we found a great heap of dung and filth of sorts, evidently the accumulation of many months, at the side of a public roadway and close under the wall of her neighbour's house. Now what did I tell you as we stood there?

"You told us you were not angry, you blamed nobody, it was all her ignorance, because after she had taken the trouble to sweep her house and court she had only chucked the ashes and ordure and litter over the wall and out of sight."

Just so. I told you she knew no better; she evidently preferred cleanliness to filthiness; but that her ignorance contented her with chucking the stuff over the wall and out of sight. Had she known better she would have carried the stuff outside the village and thrown it on to some site well away from the houses. As it was, I said, so far as the injurious effects of the stuff itself were concerned, her labour was in vain, for the stuff might have been just as well piled up in a corner inside the court as against the wall outside.

"Yes. That is what you said. And you promised also to tell us how this stuff produced sickness."

Quite true. I am coming to that point presently. But first I wish to remind you that we found similar dung-heaps in most of the courts and lanes we visited, and also at every few paces all round the village outskirts. In fact we found the whole village, inside and outside, dotted all over with these heaps of filth of sorts, including bones of cattle, rotting carcases of cats and dogs, filthy old rags and very foul clothing evidently cast off from some deceased or sick persons, and also portions of cattle gear and clothing stained with the blood and matter from some foul sore or wound in the animal's body. Was it not so?

"Yes, Sir. You pointed out all these things to us with the ashes, nightsoil, stable litter and other refuse matters of these dung-heaps, and you said the dung-heap was the proper place for them, and you also said it was quite right to keep them separate from the stacks of cow-dung fuel."

Well, I don't think you quite understood my meaning. What I said was that the dung-heap was the proper place for all sorts of filth and refuse of a decomposing nature, but at the same time I very emphatically said that "the village was not the proper place for the dung-heap." As for the cow-dung fuel, I told you it was not reckoned as filth, and should be kept in stacks entirely distinct from the dung-heap, but I warned you that these stacks should be always kept in a dry and airy place and be carefully protected against rain.

"Indeed we thoroughly understood you. You said the dung-heaps had no right to be in the village at all, but that we ought to have special fixed sites for them outside."

We will talk about them presently. But now I must tell how these dung-heaps, in and about your village, act to pollute its air and to produce sickness. You have more than once assured me that your season of sickness only comes after falls of rain, and most severely so after the hot weather rains, and that the form the sickness assumes is usually that of fever, and that its attacks are popularly attributed to strokes of chill. There is not a doubt of the truth of the popular notion which attributes the occurrence of these seasonal fevers to changes of climate and season, but there are other circumstances which are also, at such times, brought into activity as causes which favour the action of the weather in the production of the class of diseases which is commonly designated by the term fever.

And this is the point I wish you to pay particular attention to. I started by telling you that air is essential to the maintenance of life, and pure air to the maintenance of healthy life. And I explained to you how the admixture of other matters with the air we breathe deprived our bodies of their full and proper amount of pure air, and thus diminished the natural strength of the body. That is to say impure air subjected the body breathing it to a starvation of pure air and thus reduced the bodily strength below its natural standard in proportion to the amount of the impurity in the air so breathed, just as the reduction of the ration of pure food by the admixture of impurities, reduces the bodily strength by starvation.

This is precisely what occurs in your village after a fall of rain. You are all subjected to a starvation of pure breathing air, greater or less in severity according to season and circumstances, and consequently you are all more or less reduced in bodily strength, and less able to resist the action of climatic influences. Do you understand now how this happens?

"No indeed. How should we unless you tell us. All we know is, that at such times most of us are more or less out of sorts, that almost every house has some of its inmates floored with fever, and that many die."

Well then, I will try and explain how it comes about. First, you must know that the sickness is produced by the influences of the weather. And next you must know that the severity of the sickness is produced by other circumstances independent of the weather. You all believe that the action of the weather at such times is by a stroke of chill. Be it so. Let us take it as a very common cause of fever. But there are other circumstances of which you are not aware which also act either directly or indirectly in favouring the action of the weather at such times in the production of sickness.

Now in this village the most active and powerful of these other circumstances which aid the action of the weather in the production of sickness, is the filthy condition of the village itself. And this is how it comes about. Every one of these hundreds of dung-heaps we have seen, directly they are saturated by the rain, begin to rob you of your pure breathing air and to give off foul and unwholesome exhalations which are unfit for breathing purposes. For when these dung-heaps become saturated by rain, aided by the action of the air and heat, they quickly begin to ferment and decompose and to give out a variety of exhalations into the general atmosphere of the locality.

These changes are effected by the matter of the dung-heaps consuming the pure air, just as we consume it in the function of breathing, and producing other air which is impure and unfit for breathing purposes. And as these dung-heaps are in all parts and all round the village, the whole atmosphere of the village becomes pervaded with impure air. The result is a famine of pure air, for none can come from outside the village without first mixing with the foul air rising from the ring of dung-heaps encircling its outskirts, unless, indeed, a strong wind blows and, dissipating the exhalations, replaces them with pure natural breathing air. But these strong winds do not often blow at such times, and then the consequence of the air famine is a debilitated state of the body which disables it from resisting the action of the weather, and thus renders it prone to any disease influences present in the air, and especially to the action of the deleterious exhalations given off from the dung-heaps.

This then is the nature of the injury you suffer at such times from the presence of these dung-heaps in and about your villages. These dung-heaps, if they do not prove directly harmful through the unwholesome exhalations they give out, at least rob you of your breathing air by consuming it themselves to produce these exhalations, for you must know that the process of decomposition and putrifaction with their attendant exhalations cannot go on without the consumption of pure breathing air aided by *moisture* and heat.

And this is the reason why in dry seasons you suffer none of this sort of injury from your collection of dung-heaps. In dry seasons the process of decomposition (except in bodies which contain moisture in themselves, such as the carcases of dead animals or the juicy parts of plants, &c.) is very slow on the surface and almost entirely arrested below it. Your breathing air is then not consumed by these dung-heaps to anything like the extent or with the rapidity that obtains when they are in active decomposition. You should remember this fact, because, as I pointed out to you on the other side of the village a while ago, you are in the habit of forming dung-heaps on the margins of your cattle ponds. You remember I showed you half the dung-heap was actually in the water, and explained to you the very objectionable nature of the practice.

" Yes. You told us it spoiled the water for use either by man or beast, and that the dung-heap itself was a constant source of bad exhalations. We consequently at once, in your presence, set men at work to remove it and warned the people against the continuance of the practice."

I know you did, and you did what was right. Dung-heaps in such situations are always very injurious, because, owing to the constant presence of moisture, they are always undergoing decay and giving out bad exhalations. Dung-heaps should never be formed in pits or hollows, because such depressions catch water and favour the decomposition of the filth cast into them. This is a very important point and you should remember it. Further you should never collect dung-heaps about your wells. We will speak on this point by and by.

" Sir, all you have told us is very important. You have done us a great service. We will not forget your words."

Well I hope not. But it is no use your remembering my words if you fail to act on them. And now I will tell you how you may easily act on what I have said. But first I must finish what I have to say about your dung-heaps. We got as far as saying they were only actively injurious after being wetted by rains.

" Yes. You told us how they then made us all ill by polluting the air we breathed with foul exhalations, and that they did not make us ill in dry weather because their decomposition was at such times arrested."

Well, what I said was that in dry seasons these dung-heaps did not consume your breathing air and replace it with their own foul exhalations to anything like the extent and rapidity with which they did so in wet seasons. But I don't think I said they did not produce sickness in dry weather, because, as a matter of fact, I know they very often do produce diseases and ailments even in dry weather.

" You told us at the dung-heap near the pípal-tree well that these manure heaps did little damage in dry weather, compared to what they did in wet weather. You remember, Sir, you said they were very unsightly objects and discreditable to us as respectable people, and at the entrance to the village you said, ' Now look at this. What sort of a welcome is this to give a stranger, to make him pass over a filthy heap like this before he can enter your village ? This is very different from the traditional *attar* and *pan.*' And we all laughed and said those days had gone by, that we were poor ignorant cultivators and would do whatever you wished."

Well done ? Now I hope you will remember the rest of my discourse as correctly as you have that little passage. But now I must tell you how these dung-heaps prove injurious in dry weather. Well, in the first place you chuck on to them, day by day, your house sweepings, and ordure of your children and others who do not daily go a-field for necessary purposes, as well as kitchen garbage and such like putrifiable matters ; these by their ready decomposition pollute the air with foul odours and exhalations. Then your poultry or your cattle in passing to and fro, stir the stuff up and scatter it all about the surface. Next the wind blows the lighter particles all about the village and fills the air with the dust of your dung-heaps.

Now this at least is not pleasant. What would you think if I were to take up a morsel and offer you a mouthful ? Why you would resent the act as a personal affront. But as a matter of fact you swallow many mouthfuls of it with the air you breathe. And it is through the diffusion of their dust in the air of your village, more especially in its thoroughfares and courts where the people and cattle are moving about, that these dung-heaps are answerable for many of the ailments you suffer, such as vicarious attacks of nausea and sickness, opthalmia and sore eyes, eruptions of skin, and intestinal worms. These are familiar ailments to you all, and they are most common amongst children, who, as is the wont of children, roll about and play on the ground regardless of its state in respect to cleanliness or filthiness.

" What you say, Sir, is very true. Our children suffer all these ailments."

Well, you see what an array of evils we have brought against these dung-heaps. Now what think you is the remedy for all this ?

" Removal of the stuff out of the village into the fields. This was the order circulated in our district by the civil authorities three years ago, and at first we persuaded many of the people to do so, but there was no system authoritatively enforced, and the people quickly relapsed into their old habits."

That is a great pity, because the only true and efficient remedy is the regular and systematic removal of the stuff outside the village. Let me describe to you the plan which appears to me best suited to your requirements. How many wards are there in this village ? Six. And there is a lambardár (headman) over each ward. Very well. Then I would propose the construction of a proper manure store for each ward of the village, and place it under the charge of the lambardár of its appropriate ward, and hold him responsible for its proper supervision and management. His duties in this matter would be to prohibit the storage of filth or manure material, that is the formation of dung-heaps in any part of his ward ; to see that the residents in his ward periodically, at latest once a week, removed their house sweepings, cattle litter, and other refuse matters to the manure store (*Khad gúdám*) of their own ward and to no other place except to their fields for immediate use as manure ; and to superintend the division of the manure collected at the proper time when it is required for the fields ; to facilitate this division, the houses of his ward might be grouped in four divisions or more if necessary, and the manure store might be divided into four or more divisions according to the number of groups of houses ; the members of each such group storing their manure together in their proper division of the manure store.

The manure store itself should be a mere mud wall enclosure of square shape, situated on some well selected and elevated site at least 150 yards from the village walls. The size of the enclosure need not in most cases be more than 30 or 35 paces square and the enclosing walls should not be more than 3 feet high. The object of enclosing the site is fourfold. *First.*—It provides a conspicuous, fixed, and recognized site for the shooting of all manner of filth and refuse matters, and facilitates the enforcement of the prohibition of shooting such matters on any other spot. If the site of the manure store is not enclosed, one person throws the sweepings, &c., of his house here, another there, a third further off, and so on, till a wide surface is covered with little dung-heaps in detached clusters.

Second.—The enclosure protects the material from being trampled and scattered by people and cattle passing to and fro between the village and their pasture-grounds or fields, and also saves the lighter particles from being driven about by winds.

Third.—The enclosure serves to preserve the strength and virtues of the material as a manure, and at the same time protects pools and tanks and often wells from a very common source of surface contamination. If the site of the manure store is not enclosed, heavy rains and surface drainage dissolve and carry away into the hollows or pools and tanks close by, much of the lighter particles of the manure with much also of the soluble salts which constitute its most valuable property, thus not only injuring the stuff as a manure material, but also spoiling the water in pools and tanks which are filled by the surface drainage. Whereas, the rain which falls on the manure within the area of the enclosed site will be sufficient only to saturate the material and favor its rapid decomposition into manure mould charged with all its valuable salts in undiminished quantity.

Fourth.—By systematically and regularly collecting all village sweepings and refuse matters in a few fixed, recognized, and enclosed sites, the work of keeping the village interiors and outskirts is reduced to a minimum if not altogether removed, and the sources of unwholesome dust and exhalations is reduced from hundreds in and about the village at every few steps to only 4 or 6 at wide intervals and well away from the village. The resulting advantages are that the air of your village is saved from a very prolific source of impurity and at the same time is renewed by fresh supplies from outside which come in untainted through the wide avenues between your manure stores.

Now all these four objects are attained by the simple and inexpensive construction of a few enclosed manure stores. They will not only give you a purer air to breathe but cleaner dwellings to live in. I can confidently recommend the plan to your acceptance and early adoption into practice. I don't say that the result will be an entire immunity from your seasonal sickness, for that in the first instance is produced by climatic influences which are not so easily remediable as is the filthy condition of your village, which, as I have endeavoured to show you, favors the action of those influences. But this much I feel justified in saying, namely, that if you adopt this system of village conservancy you will escape very much of the sickness and mortality you now suffer with each return of the sickly season. Because I see and know the good effects and great advantages of a systematic conservancy in those places where it is authoritatively and systematically carried out.

"There is no doubt, Sir, that all you have said is quite correct, and we thoroughly understand the advantages of the plan you recommend. It is very simple and suited to our requirements, and there will be no difficulty in putting it into practice. Only to keep it up we require the supervision of the district authorities.

Well, I am glad you approve of the plan, and would now advise you to talk it over amongst yourselves and arrange for the construction and working of the manure stores as I have suggested. And if you find that you require the aid of official authority, I refer you to your Deputy Commissioner. He will give you every assistance in carrying out your village conservancy on this plan. But you must first move in the matter and show that you are earnest in your desires on this subject.

It is well worth your while to do so, as you will thereby not only escape much sickness and untimely mortality, but greatly improve the comfort of your dwellings. Look at the comparative freedom of your countrymen, who serve Government in the Army and Police, from sickness and mortality. It is a notorious fact that they suffer less and die less rapidly than you do in your villages. Yet they are your own people, observe your own modes of life and feeding, and differ from you only in the better sanitary condition of the places they dwell in whilst in Government employ. I can tell you from the vital statistics of the Punjab during the past 10 years, that out of every thousand sepoys, only 3 die of fevers in the year, and of police only 2. But amongst the rural population made up of the inhabitants of villages like this of yours, the number rises to 19½ or nearly 20 per thousand every year. This high figure, I must tell you, includes both sexes and all ages. But if in order to assimilate the parties compared, we strike out something less than ⅔ of the fever deaths in villages as occurring in women, children and old people, we still have 7 as the number of village men who die yearly in every 1,000 men between the ages of 12 and 60, which are the ages of the sepoys and policemen. That is to say, 3 out of every thousand sepoys and 2 out of every thousand policemen die from fever in the year, against 7 out of every thousand of your adult male population in villages. I only mention this to show you in a rough way one of the benefits of a good conservancy. Now this is what I referred to a while ago when I said I would prove to you that you did not get accustomed to bad air, and that you did suffer inconvenience from it. In your bad air you suffer in deaths from fevers alone, more than twice as much as your brother in the army and more than three times as much as your brother in the police, both of whom breathe a purer air than you do.

" It is a great difference, Sir, but then they have their conservancy done for them by order. We too require some sort of authority to enforce conservancy regulations in our village."

You told me just now that you had some 3 years ago received the order from the civil authorities to adopt and carry out certain sanitary regulations in this village. And you said that at first many did conform to the new regulations, but that owing to want of supervision the people quickly relasped into the old ways. This proves to me that you were not aware of the importance of those regulations and of the benefits to be derived from their habitual observance. You have now no such excuse, and I hope you will exert yourselves in a very important matter which concerns your own welfare.

" We know it does, and are willing to adopt the plan you suggested, but we do require the aid of authority to enforce the regulations for removing sweepings, &c., to the manure stores, and to prevent quarrelling in its division amongst the contributing households."

This is a small matter and will be at once remedied if you apply to your Deputy Commissioner. Your Civil Surgeon also will assist you in this matter. If you will only make the first move you will find no difficulty at all. All the civil authorities will willingly assist you. Tell your Tahsildárs you want to establish this manure-store system of conservancy, and I promise you there will be no difficulty in meeting your wishes. But you must exert yourselves, you must not expect others to do everything for you.

" Your advice, Sir, is very good, and it is all for our benefit. We accept all you say and will act upon your advice. It is all through the kindness and good-will of Government."

Yes; you should be thankful that you live under a Government which is so thoughtful of your interests, and you should come forward with your own exertions to help it in its endeavours to better your condition. Now where is the chowkidár with the birth and death memorandum books ?

" Here, Sir, and here are the books.

Have you entered in this book every death that has occurred here since the beginning of the year ?

" Yes, Sir, every one. The *banniah* (grocer) generally writes the entries, sometimes the *patwári* (revenue clerk), and sometimes the *maulvi* (school master)."

I see you have 9 deaths entered altogether. Now then, lambardárs and you others here, listen while I read out the names. * * * * Are these all that have died here this year ? You are sure that's all. Well that's satisfactory. * * * What did you say ? You did not hear whose name in the list ? * * * * '*Básri*'; but it is not among the entries. Who was Básri ? * * * * wife of Juma, and died of fever three months ago, about. No the name is not among the entries. How do you explain this chowkidár ?

" Well, Sir, what can I say. I must not tell 'the presence' a lie. I remember the death and thought I had it entered, but forgot it I suppose. It is my fault, and shall not happen again. You are master and are kind to your poor helpless slave."

The omission is the result of your neglect to enter the death at the time of occurrence. Remember, in future, you must always get the entries made at the time of the occurrence, whether it be a birth or death. You must not postpone this duty to another day.

Now look here, of the 9 deaths, you have entered 5 as from fever, 2 convulsions, 1 diarrhœa, and 1 whooping cough. This is satisfactory and indicates that you enter the diseases by the names you get from the deceased's friends. This is what you should always do, as they know best what their relative died of. I see you have no death entered from small-pox.

" Through the mercy of Providence we have had no small-pox here this year. Last year there were several cases and 2 or 3 deaths. The Vaccinator passed through here last month and vaccinated 13 children. They have been collected for your inspection."

Send a man to bring them here. I will look at them as soon as I have done with this birth memorandum book. Eleven births are entered, 6 boys and 5 girls. Hearken to the list and tell me if this is correct * * * You know of no other.* * * Has no still birth occurred ? * * * One did occur * * * several months ago * * * Chowkidár, how is it you have omitted to enter this still birth ?

" It is true, Sir, I am to blame. I am a poor man. It shall not happen again."

This is very careless of you. You must make all these entries at the time of the occurrences. In the case of a still birth, you must enter it as 'born dead.' You have no entry of twins, * * * None have occurred * * * Well, when a twin birth occurs you must enter each child on consecutive lines with an enclosing bracket, and mark the sex of each in the appropriate column. Now, remember what I have told you. I will make a note of these omissions in your death and birth memorandum books for the information of the Police Registrar, and also of the Civil Surgeon when he inspects these books.

Now let us see the vaccinated children. Do the people readily accept this prophylactic ?

" There has been a great change in the last year or two. The people now begin to understand it is for their good, and do not run away from it as they used to do. But many have been disappointed in its efficacy as a protective, and some object to it altogether, because many children who had been vaccinated afterwards took small-pox and died."

Shall I tell you how this has happened ? Well, because they had not been vaccinated at all.

" But, Sir, they had been vaccinated and by the Government vaccinator too. He told us that the operation of vaccination would save them from small-pox, but it did not, and that is why many people have lost confidence in vaccination."

I grant, you believed they had been vaccinated and can understand your disappointment at the untoward result. But as a matter of fact they had not been vaccinated, and I will tell you why. Because the operation performed by the vaccinator was a sham, and it was you yourselves who made it a sham. The vaccinator did his part honestly and well, but you on your part spoilt his work and made it a sham. It was vaccination in name only, not in reality. Do you know how this is explained ?

" You know best. We only know that the children had been vaccinated and that they died from small-pox. "

Well I will explain how it happened. The children had the operation of vaccination performed on them, but it did not succeed and they were not vaccinated. Here come the children. Let us look at their arms and then I will continue what I have to say on this subject. * * * * You said there were 13 children vaccinated this season. There or only 11 present * * * The other 2 have gone to a neighbouring village with their mothers you say. * * * Well if the scars on their arms are as good as these, I am satisfied they have been well vaccinated. Now I want you to look well at these scars and to study them, because it is most important that you should be able to recognize for yourselves the marks of a true vaccination from those of a spurious one. You see each child has 3 or 4 scars upon one or both arms. The number of scars is the index of the amount of protection. You should never be satisfied with less than 3 scars on one arm, and if you have that number on each arm so much the better. This child, you see, has only 3 scars on one arm; they are very superficial and indistinctly pitted, but they are genuine scars. Compare them with the marks on this child which has only two ; these are quite smooth and even slightly raised above the surface ; this child has not been vaccinated ; the operation of vaccination has failed in this case ; these scars are spurious ; perhaps the child rubbed or scratched the vesicle and converted it into a pustule or an irritable sore ; this child is not protected against small-pox by the operation it has undergone. Make the parents understand this. They should have the child vaccinated again. Now look at these 4 scars on this child's arm. They are the sort of scars you should always look for on your own children. See, they are circular or oval, are well sunk below the surface, have a well-defined margin, and the interior is dotted with minute pits. Do you think you could recognize these genuine scars and distinguish them from these spurious ones ? Well it is important you should be able to do so, in order to satisfy yourselves that your children have been properly vaccinated.

" Nobody ever took the trouble to tell us all this before. We now understand. But, Sir, year by year the people are learning more about it and soon they will take to it of their own accord."

It is to be hoped they will. Now let these people take away their children, and I will go on with what I had to say about the failure of vaccination. You heard just now these people said that their children had been vaccinated direct from the arm of another child. Well that is the secret of the success of the vaccination you have just seen with me. It is the only method you should ever adopt for your own children, because it is the most simple and most successful, and saves a deal of time and trouble.

" But, Sir, we find the arm to arm method is very inconvenient, as it necessitates the collection of children from distant quarters and gives much trouble. We prefer the method by crusts and glasses and points, as of old."

This is very unwise of you, and you will, I am sure, admit quite unreasonable when you have heard what I have to tell you.

" You know best, Sir, and we will be guided by what you say, for all that you have told us is for our good."

Well listen. I told you just now that the vaccination you spoke of as having failed to protect the children who had been vaccinated was no vaccination at all, but only a sham, and that it was you, yourselves, who made it a sham. The explanation is this, namely, that you did not work with the vaccinator to help him, but you worked to thwart him. Now when you go to the Dispensary to seek relief from any ailment, you help the Doctor in his work of curing by telling him your symptoms and taking the medicine he gives you, and acting up to the regimen he prescribes. You do not tell him a lot of lies, and throw away the medicine, and disobey his injunctions. You confidently go to him for relief and honestly help him to afford you relief. But this is not the way you treat the vaccinator. With the Doctor you act for yourself. With the vaccinator you act for your child, a helpless innocent, and you fail in your duty towards your child. I do not blame you for this, because I know the fault is the consequence of ignorance. You do not know, or anyhow you do not think, what a dreadful pestilence small-pox is, the thousands of lives it destroys, in infancy especially, and the multitudes it blemishes for life. You know how often it destroys the sight or permanently scars the eyes, whilst those whose comely features have been disfigured for life by its ugly pittings are found in almost every family. Yet seeing these evils you fail to take advantage of a remedy which our beneficent Government gives you for nothing just as it gives you your medicines for nothing. You seek the Doctor freely at the Dispensary, but you shun the vaccinator when he comes to your house to protect your child from a dangerous and odious disease. I can only explain the circumstance on the supposition that in the one case you exert yourselves for your personal interest, and in the other you fail to exert yourselves for the interest of others, though they be your own dear children.

"Sir, you put us to shame. What you say is true."

But I have not brought home to you the way in which you thwart the vaccinator and make his work a sham. This I must now do because it is important you should know how your foolish acts not only deprive your children of protection from small-pox, but also bring the practice of vaccination into discredit most unfairly. Well, first—I am speaking now of the cases in which the vaccine matter inoculated from crusts or glasses or points, owing to your want of co-operation with the vaccinator—he is often unable to perform the operation as skilfully and leisurely as he otherwise would do and sometimes in consequence the vaccine matter remains on the surface and is not absorbed, next the mother very often rubs the vaccine matter off the wound with her fingers directly after the operation is performed, and again from neglect to guard the vesicle from injury it often becomes rubbed or bruised and spoiled. All these causes produce failure of the operation. If you wish vaccination to succeed you must confide in the vaccinator as you do in the Doctor, and you must help the one as you do the other. When you go to the Doctor and take a purgative draught, if it fails to act you tell him so and repeat the dose. You must treat the vaccinator in the same fair way. If his first operation fails you must tell him so, and have the operation repeated.

In those cases in which vaccination is performed with dry lymph, the operation not unfrequently fails, owing to the greater difficulty of inoculating the dry lymph as compared with the fluid lymph. And this is the reason why the arm to arm method is always preferred. Because by it the lymph is inoculated direct and fresh without undergoing any change. Inoculation by this method rarely fails to produce successful vaccination. And if you are wise it is the only method you will adopt whenever practicable.

"But, Sir, we find that method so troublesome and inconvenient. Children have to be brought together from 3 or 4 or more miles around and are often kept waiting for hours together."

Is that all you have to say against it? Well you are unreasonable. What distance do you take your children to the Dispensary, or to your shrines, or to your fairs? No, the real difficulty is this. You have not yet learnt the true value of vaccination. If you knew its real worth, you would think nothing of this trouble. On the contrary you would go a long distance to get it and would even pay for it. You do not appreciate it because it is given to you for nothing and brought to your very doors.

The object of vaccination is to stamp out small-pox by giving it nobody to seize. If the whole infant population were vaccinated within a few months of birth, there would soon be little or no small-pox, because it is the peculiarity of small-pox that, as a rule, it attacks the individual only once in a life-time. Successful vaccination is held to give the individual so vaccinated a mild and harmless form of small-pox, and thus to protect that individual from a future attack of the natural small-pox. And it has been found by experience that successfully vaccinated children, when they do take small-pox, for sometimes, contrary to rule, they do take small-pox just as others, sometimes contrary to rule, take natural small-pox a second or even third time, they take it in a milder and less fatal form. In the children we saw just now, there were only 5 under one year of age. Your birth register shows 13 births, 12 of which were before the vaccinator's arrival, so there are 7 children in this village yet unprotected by vaccination. This is not wise of you, and it is not giving those 7 children a fair chance with the vaccinated ones. In my country vaccination is compulsory within 3 months of birth under penalty of fine. If you were fully aware of the advantages of the practice you would not delay the vaccination of your children beyond that age, for small-pox is particularly a disease of infants. Now I hope you have understood all I have told you.

"Sir, you have done us great service, and told us what we never knew before. None of us can now have any objection to vaccination."

Well you ought not to have any objection to it, and for the future I would advise you to treat your vaccinator with the same confidence and assistance that you do your Doctor. You will certainly render a service to your children by so doing. It rests with you whether your children die of small-pox or escape it. Now before we part I have one or two other matters to bring to your notice, and must ask your attention for a few minutes longer. I have shown you how important a duty it is that you should keep your breathing air in as pure a state as possible, and have also explained to you the simple and inexpensive arrangements by which you may effect this desired object. You must now know that it is also a duty of equally great importance to keep your drinking water in as pure a state as possible, because, next to air, water is the most common essential of life, and pure water of healthy life. You all know how necessary water is to the support of life, and you all know from experience the difference in the effects of good and bad water. But you do not know how often you turn good water into bad. A while ago in the village, we came upon an old dismantled well which you told me had been abandoned because its water had become brackish and undrinkable. You remember I told you at the time that in my opinion your own carelessness had brought about this result, because the well showed no signs of any provision to protect it from surface impurities and other common means of pollution. You excused yourselves by saying that the well had always been so. To which I replied that I gave your ancestors credit for more common sense than to found this village about a well, the water of which was undrinkable, and I promised to speak to you about your village wells by and by. I will now redeem that promise.

"You said, Sir, at the pípal-tree well, that you would tell us of its defects and the objection against the dung-heap there, because we said the water of that well was the best in the place."

I did. You are quite right. I will now tell you how your carelessness regarding that well is constantly exposing its water to contamination. You remember I pointed out to you that the well had no parapet, and that the ground all about it was miry and sloppy from the spilling of water drawers and bathers. I pointed out also a little shallow cistern at this side of its mouth, where the water trough discharged, and some women were washing foul clothes in it, and asked you if that was the proper place for them to do such a thing. I showed you also a dirty foul gutter of stinking sludge which twisted about over the surface down to an excavation at the side of the field only a few yards from the well. And I drew your attention to the dung-heap on the other side of the well and asked you to note that it was on a higher level than the well. You remember all this.

"Yes, Sir. And you said the wood work of the wheel and the cordage of the water pots was all rotten, and caused the bad smell of the water, but that the crust of water-moss on the wood was a salutary protection, and that the constant working of the well alone saved the water from being poisonously polluted."

That's quite correct. But you admitted, whilst excusing yourselves under the shelter of the custom of the country, that the water acquired a rotten smell if the well was ceased to be worked for only a single day. The rotten smell as you know is owing to the rotting of the green cordage and you told me it ceased as soon as the material become seasoned. It may be so, but this is not the source of injury to your well water to which I wish to draw your particular attention, because your wheel work and cordage are necessary to the working of the well. But the other defects I have mentioned are not only unnecessary, but they are positively objectionable.

Let us take them in the order I mentioned. First, was the want of a parapet to protect the well from surface drainage and the spilling of bathers and water-drawers, and next was the washing of dirty clothes on the margin of the well's mouth, with splashing of the dirty water back into the well. All these sources of contamination may be prevented by protecting the mouth of the well with a parapet wall all round; it need not be more than 1 or 2 feet high, but it should be of pakka masonry. Then there was the filthy tortuous gutter of black sludge and the pit into which it led. Both these should be done away with altogether and the ground filled up to the surface level with fresh clean earth from the adjoining field, because they are very liable to injure the well water by percolation of their filth through the soil. Lastly, there was the dung-heap only 4 or 5 paces from the margin of the well's mouth. Every puff of wind blows some of its filth into the well, and every fall of rain washes some of its material into the same place, because the slope of the ground is from the dung-heap to the well. This is no place for a dung-heap. You should at once remove it, plough up and level its site and prohibit the collection of such stuff near your wells.

"All your suggestions, Sir, are good and we approve of them. The dung-heap we will have removed at once; but the parapet and filling up of the pit will require to be done by order of the Civil authorities. The village *malba* fund can meet the expense, but we cannot move in the matter without orders. If you will order it these improvements can be effected."

Very well I shall recommend this with other improvements, such as the manure store, &c., in my report to Government of the inspection of this village. But what I want you to do, is to think of these things for yourselves, and ask the aid of your Civil Surgeon in matters of sanitation as you do in matters of medicine. We have a proverb which says 'prevention is better than cure.' I recommend you to bear it in mind and to act up to its teaching. If you apply to your District Surgeon to treat you sanitarily, you will save him the trouble of very often treating you medically. The work of protecting your drinking water from common causes of impurity is very simple and sure and inexpensive when you have once fairly adopted the manure-store system of conservancy. The most important requirements next to this are parapets to your wells, and enclosing walls to your cattle ponds with a ghát on one side for watering purposes. At present, owing to your carelessness on these points you are daily drinking water which is unnecessarily polluted in a variety of ways, which not only render it unwholesome, but in times when epidemic or contagious sickness is amongst you, render it an active means of spreading disease. You should bear these points in mind and lose no time in protecting your sources of water-supply from the easily preventible causes of pollution and contamination which I have brought to your notice. There are some other matters relating to your food and clothing on which I should have liked to say a few words to you, as they also exercise an important influence on the health of the individual, but I have already detained you long enough and given you sufficient to exercise your intelligence and energies on the greater questions which affect the health of your entire community, and I hope you will not let them pass from your thought as quickly as I must now go from amongst you.

"No indeed, Sir. You have given us words of gold. Your visit and kindness will not be forgotten. We hope you will again favour us with a visit and be satisfied that your advice has been acted on."

Well I hope so. I thank you for your assistance and patient attention, and in taking leave of you, have only this much to say: call a meeting of your village representatives and discuss together the subjects I have brought to your notice, and at once make arrangements for establishing the manure-store system of village conservancy as I have indicated. It is the first and main step towards putting this place into a decent and wholesome condition.

Syce ! bring my horse * * * You need not escort me further, lambardárs. I shall put my horse into a gallop directly I get out of this excavated bit of ground. In the rains I take it each of these pits fills with water and forms a stagnant pool of the surface drainage from this dung-strewn area round your village.

"Yes. But they quickly dry up, except one or two like that one over there and the pond you saw on the other side."

But this is a horribly filthy puddle, only fit for pigs to wallow in * * * *. Your buffaloes even refuse to enter it ? * * * * Well they show their good sense. If you had manure stores here you would escape the formation of these filthy collections of liquid sewage, for the surface around would then be cleared of all these scattered heaps of dung and ashes and filth of sorts.

"Very true, Sir. The manure store will quite change the state of our village conservancy."

Well, lambardárs, I look to you to exert yourselves to have them introduced here. They have been introduced in several villages and with complete success. So that you really have no excuse if you fail to get them into work here. Now you can return to the village. * * * You wish to speak to me privately ? What is it, zaildár ?

"What I wanted to say, Sir, is this. All you have told us is most excellent and we are most thankful to you. We agree to all you have said and are prepared to carry out every one of your suggestions. But, Sir, we are ignorant cultivators and there is no unanimity amongst us. You have given us no orders and without official authority we can do nothing."

You surprise me, zaildár. You and the lambardárs have more than once this morning told me that three years ago orders were issued and certain rules circulated by the District officer. You even said that they were partially carried out but that the people relapsed into their old habits for want of proper supervision. It seems to me the fault lies with you and the lambardárs. I don't blame you, for I know you have other things to engage your time and attention, and are perhaps not fully alive to the importance to yourself and your own people of this subject of village sanitation, but at the same time I must tell you plainly that unless you and the lambardárs exert yourselves in the furtherance of sanitary improvements, progress in this line will be slow and unsatisfactory.

"What I meant, Sir, was that we require to be supported by official authority. If the District officer or the Tahsíldár would enquire into these matters and set them going, then there would be no difficulty in carrying on the work; only it would require supervision."

Well, zaildár, I don't see that you have much advanced your argument. You have already got the Government orders, and if you require the support of the District officers in carrying them out you have only to ask for it. In some Districts the Tahsíldárs periodically enquire into the working of the manure-store system and no difficulty is experienced. If your object is independent authority for yourself, that is another question altogether with which I am not concerned. Your duty in this matter of village sanitation is to exert yourself in furthering the wishes of Government, and I hope that after all our conversation to-day you will now exert yourself earnestly in the direction indicated. Your District Surgeon and District officer will give you every assistance you may require.

A Summary of Inspection Reports of towns and villages inspected by Surgeon-Major H. W. Bellew, C. S. I., Sanitary Commissioner, Punjab, during the cold season of 1880-81.

LUDHIANA TOWN

Inspected on the 16*th,* 17*th, and* 19*th October* 1880.

Preliminary remarks.

The general aspect of the town has been described in a previous report.

Chief Sanitary defects and suggestions.

Streets and drains.

The streets generally in a clean and well-kept condition. Many, however, were without drains and side-gutters, and in those where they had been laid down, they were more or less defective, faulty in shape, and in bad repair.

The streets and alleys of the whole town require to be provided with surface side-gutters on a uniform and regular system. Sanitary Commissioner understands that a project for the drainage of the town has been prepared and forwarded to Government for consideration.

System of sewerage, drainage, and conservancy arrangements in force.

The sewerage and drainage of the town is supposed to be disposed of by two main outfall drains, on the north and south sides of the town, which discharge into the Budha Nulláh. But they only do so after rains, by surface drainage, owing to the defects in the system of street drains and gutters, many of these being interrupted, and others isolated from the main channels.

All street sweepings, house refuse, and latrine ordure are daily removed by cart and donkeys to store sites on well-selected spots outside the town. But the provision for liquid sewage is defective, as above stated.

Water-supply.

From wells 308 in number. The water of 13 of them has been analyzed. They are periodically cleaned out, and Sanitary Commissioner found those he saw in fair order.

Latrines.

The old fixed latrines have been done away with and the moveable latrine system introduced. There are 111 moveable latrines with 4 compartments in each. They afford accommodation for 444 people, and are placed in sets of from 20 to 25 at different convenient sites outside the town. Each moveable latrine consists of a frame-work of wood set upon wheels and closed in with a screening of coarse canvas. Each compartment is provided with a hanging curtain, and foot boards, beneath which are placed the utensils dressed with dry-earth. The ordure is daily carted away and mixed with the general mass of sweepings, &c., in the manure-store godowns. The utensils are of porous red pottery, and quickly get fouled, and are easily broken. Their use should be abandoned and glazed pottery or stoneware used instead. These latrines are a very great improvement upon the old kutcha buildings, which have now fallen into ruins. These old sites should be now levelled and the ordure soiled *débris* removed and added to the manure godowns. The Deputy Commissioner has already commenced doing this with the old latrine opposite the Fort. But the work should be extended to all of the others.

Slaughter-yard.

The beef slaughter-yard and shambles have been removed from the old site in the village to another very well selected site close outside the village. But the building is in a very defective and dilapidated condition, and wears a most uninviting look. The whole should be enclosed within boundary-walls properly built. The slaughter-yard should be provided with gibbets, and a slate-covered counter for quartering. The shambles require to be rebuilt on a uniform plan and pattern. The platform on three sides of the square should be of uniform height and regular shape, and the props of the thatch roof should be at regular intervals and properly set up. The surface layer of the platforms should be of burnt bricks to prevent wear. The same remarks apply to the shambles on the opposite side of the town.

The goat slaughter-yard is in good condition.

Cremation and burial grounds.

There are 9 burial and 2 cremation grounds. No alterations have been made since last inspection, except that the large Muhammadan burial-ground has been enlarged.

Remedial measures.

The town is badly in want of a regular and uniform system of surface drains. As before stated, Sanitary Commissioner understands that a plan and estimate of a proposed scheme of surface drainage has been prepared, and been submitted for the consideration of Government.

Miscellaneous.

The general sanitary condition of the town has been greatly improved since the system of carting away all refuse, &c., as manure, to fixed sites outside has been introduced. All sweepings, refuse, ordure, &c., are now daily carted away to two well-selected sites (on the north-east and north-west of the town) and stored for sale as manure or kiln fuel. The Deputy Commissioner is having these sites enclosed within boundary-walls, which is a great improvement. He anticipates an income of about Rs. 1,000 a month by the sale of this manure when the system is in full working. Mr. Wakefield sent Uda Ram, Extra Assistant Commissioner, to Amritsar to study the system practised there, and speaks highly of the energy and care with which he has carried out its introduction here in the face of great opposition and many difficulties. Mr. Wakefield himself deserves great credit for the active interest he has taken in this matter and others relating to the sanitation of the town and district generally. With the aid of the District Committee, Mr. Wakefield got the Commissioner's sanction to the employment, from District Funds, of one Superintendent on Rs. 100 per mensem for the whole District, 3 Assistant Superintendents on Rs. 20 each for each Tahsíl, and 10 Jamadárs at Rs. 8 each, who can read and write for the three Tahsíls.

Remarks by Sanitary Commissioner.

I found a very marked improvement in the sanitary condition of this town since my last visit in November 1878. The street conservancy particularly has been improved. What the town now wants is a regular and uniform system of surface gutters, which should be provided as soon as funds admit, and laid down on a carefully considered and previously prepared plan and estimate.

The Deputy Commissioner, Mr. Wakefield, deserves great credit for the improvements he has carried out in the public scavenging of the town, and the introduction of the new latrines. The improvements he has in hand for the slaughter-yards and shambles, when completed, will be a great boon to the butchers and their customers.

SIALKOT TOWN

Inspected on the 21st and 22nd March 1881.

Preliminary remarks—Topographical account.

Siálkot is an open town, of very irregular shape, situated on a level plain which lies at the foot of the Jammu Hills. The site of the town is slightly raised above the general level, and at the fort rises into a considerable eminence which overlooks the whole town from the north-east. Around the town there are numerous gardens and large trees, and in parts the field cultivation comes quite up to the town skirts. At short distances also are many brick-kilns. The military cantonment lies about 2 miles to the north of the town, and the Civil Treasury, Court House, &c., lie between the two.

There is a fine view of the snowy range of the Kashmír mountains from the station, and their vicinity is supposed to temper the hot months with cool breezes from the hills.

Chief Sanitary defects and suggestions.

Streets and drains.

The streets generally are paved throughout the town, and are furnished with surface gutters at each side in all the main lines of thoroughfare. Sanitary Commissioner found the streets generally well swept and in a wholesome state, but in several places the surface gutters were much out of repair. These gutters are all angular open channels, and are connected in five or six distinct systems of ramification which discharge in as many different spots immediately beyond the houses all around the outskirts of the town, where the sewage stagnates in depressions of the surface till scoured out by the monsoon rains. Sanitary Commissioner understands that the Municipal Committee is now having a plan of the city made with the levels noted. It would be as well if at the same time they caused to be prepared a plan and estimate for a system of sewerage and drainage for the city. The most suitable plan, Sanitary Commissioner thinks, would be a circular city drain (open) to catch all the interior drains as their branches all coalesce to discharge at a few different spots on the town skirts. The circular drain might be projected some hundred yards away from the city as an outfall sewer, and beyond that it might be continued in a kutcha channel for the utilization of the sewage in irrigation of fields by means of *jhalárs*, or irrigation wheels. The circular drain might be an independent work, and the interior drains might be repaired and renewed in sections, as funds sufficed. All drains should be superficial, open and saucer-shaped; they should be on each side of the street, and the roadway between should be metalled or paved and convexed. The present drains might all be easily brought into three or four sets of systems discharging at different spots into the circular drain.

System of sewerage, drainage, and conservancy arrangements in force.

The gutters and drains discharge by several outfalls into hollows or watercourses on the surface immediately around the town, and the sewage stagnates there till scoured away by the flood of the rainy season. The conservancy arrangements are fairly good, the street sweepings and house refuse, &c., being removed daily, morning and evening, by the municipal sweepers to sites set apart for the purpose in different parts of the town and suburbs. There are about 27 of these sites, usually some retired corner or plot of waste ground, and none of them are enclosed. The stuff collected at them is removed by the conservancy contractor by his own bullock and donkey men during the forenoon to 10 A.M. in summer, and noon in winter. He pays the municipality for the privilege of removing it, and the sum realized by the municipality from this source has been gradually increasing year by year,—the figures being Rs. 869 for 1878-79, Rs. 1,035 for 1879-80, Rs. 1,595 for 1880-81, and Rs. 2,315 for 1881-82. This is very creditable to the municipal management so far as it goes, but a town of this size, with the existing demand for the stuff as fuel and manure, should yield at least Rs. 10,000 a year. It would be a better arrangement if the municipality constructed four or five, or more if necessary, mud wall enclosures at convenient sites *outside* the town instead of those now in use *inside* the town. It would enable them to deposit the stuff for removal by a contractor more efficiently than is now done, or to sell it by auction at short periods on their own account, whilst it would establish fixed sites for shooting rubbish and filth of all sorts, and reduce to a minimum the spots on which it is now the practice to cast rubbish, &c., both in and around the town.

Water-supply

From wells. There are 222 inside the town and 15 round about outside. The average depth of the water below the surface is 65 feet, and its depth in the wells 8¼ feet. During the rainy season the water rises 2½ feet or so in the wells. In 6 of the wells the water is brackish, and in the rest it is sweet and considered wholesome. There are besides 2 pucca and 1 kutcha tank. Several of the wells require repairs to parapets and conduits for waste water. It should be a rule to provide every well inside the town with a waste-water gutter or conduit, and this wherever practicable should be connected with the nearest street drain or gutter. This would very greatly simplify the flushing of the drains, and would provide a more or less regular flow during some hours of each day of sewage for the circular drain before referred to.

Latrines.

There are 17 altogether, 10 for women and 7 for men. They are all roofless and mostly of the same pattern, *viz.*, a row of compartments on each side of a long wall. Dry earth is used for them. The one Sanitary Commissioner visited in the vicinity of the old Fort, was in very fair order, but unprovided with utensils, and the floor emitted a powerful stink, proving that it was not always in the well kept condition when Sanitary Commissioner saw it. Sanitary Commissioner noticed also that the fields about the latrine were freely used as easing grounds. The hut close by this latrine had very little dry earth in it. The latrine service might be much improved. The privy soil is leased to a contractor. Last year it produced Rs. 60 only, and this year the bid for the contract has been Rs. 96. The sum might be quadrupled by careful management. Sanitary Commissioner thinks the number of the public latrines might be advantageously increased. Any new ones that may be built should be roofed (roof propped on pillars for ventilation) and furnished with iron or glazed-ware utensils.

Slaughter-yards.

There are 2 slaughter-houses, both on the north side of the city; one near the old Fort, and the other in the Mohulla Attari. They are merely spaces enclosed by walls about 4 feet high, and are not roofed nor paved. It would be advisable to construct a proper slaughter-house on the plan of that at Delhi, but of smaller dimensions. The garbage is removed by municipal sweepers, and sold along with town-sweepings, but without a paved floor and counters for quartering the meat on, it is impossible to keep such places in a wholesome state.

Cremation and burial grounds.

There are 4 cremation grounds, none of which are enclosed; they are at considerable distances from the city. There are 10 cemeteries which are enclosed, and several others which are not so; all are in the suburbs round the city. It is highly advisable that the number of burial-grounds should be restricted, and that the areas of all should be enclosed.

Remarks by the Sanitary Commissioner.

The report for this town is generally of a satisfactory kind. The members of the municipality are alive to the importance of sanitary improvement but want experience and guidance. The preparation of a map of the town is a move in the right direction. It would be as well at the same time to prepare a plan of drainage and sewerage as before suggested to be completed in sections as money became available. The manure godowns proposed would be a great improvement over the present system of depositing town filth previous to removal by the contractor. The members of the municipal committee deserve credit for the general management of the conservancy arrangements, and I would invite their earnest attention to the above points.

INSPECTION REPORT OF LAHORE.

Inspected on the 26th, 27th and 28th October 1880, by the Sanitary Commissioner, Punjab.

Preliminary remarks.

At the time of Sanitary Commissioner's inspection many of the streets were in process of being widened in connection with the water-supply works, and they did not consequently appear to advantage.

Chief Sanitary defects and suggestions.

Streets and drains.

No improvement is noticeable in the state of the streets and drains. Sanitary Commissioner thinks that they are in a more decayed, neglected, and foul state than previously described. On the completion of the water-supply scheme there should be no difficulty in planning a system of surface gutters, for the conveyance of the town sewage into outfall drain already existing. These open surface drains once laid down could be easily kept clean and wholesome by regular flushing. In their present condition the street drains and sewers are a very serious and dangerous sanitary defect, and a reproach to the capital city of the Province.

System of sewerage, &c.

There is no system of sewerage, drainage or conservancy in force in this great city. Everything connected with these most important measures is either altogether neglected, or done in a careless and half-hearted way. The new outfall sewer, which conveys the sewage of the southern, eastern and south-western parts of the town to the Ravi, has been finished since Sanitary Commissioner's last inspection. Provision was made for drawing off the sewage for purposes of irrigation, but Sanitary Commissioner understands that the applicants for this sewage have been put off on the excuse that their fields were too close to the European bungalows. The manure godowns started by Major Harcourt, the late Deputy Commissioner here, as well as the conservancy arrangements, described in his letter (see Appendix B, Sanitary Administration Report 1879) of February last, have proved failures for want of efficient supervision and arrangement. The Muafidar cultivators, Sanitary Commissioner understands, have been allowed to resume their old habit of carrying away the city sweepings free of cost, with no other restrictions than of limited hours. This, of course, has led to the abandonment of two of the manure godowns, and the stuff collected in the others finds no purchasers owing to the number of Muafidars having been doubled from 58 to 116 since February last, by making free the 58 who formerly paid for their manure.

Water-supply.

The works connected with the scheme in hand are in progress, and well advanced.

Latrines.

Those at the Akbári gate and Budhi Khana have been restored upon a new plan. The floors of the compartments are paved with slate, and sloped from each side to a depression down middle line formed by the angle of junction of the two slopes. This depression passes through an opening in the wall to a V shaped drain which runs in rear of the latrine, and ends at one end in a square cistern or sunk reservoir, also of slate. Some of the compartments in the first latrine were provided with seats (Kadumchas), but the other had none. The visitors straddled across the central line of depression, and the bare floor received everything. In neither latrine were there any utensils, nor were they dressed with dry earth. The first was closed to use at time of Sanitary Commissioner's visit, and the other seemed but little used, although its rear drain stunk strongly of urine even in the short time since it was finished. The whole plan of this latrine is faulty, and a mere waste of municipal money. The plan should have been submitted to the Sanitary Commissioner's office for opinion, or at least such an outlay of the Municipal Funds should not have been made without proper authority. The other public latrines are in the old state of disgusting filthiness. They defy description and are a disgrace to the place. With the marked improvements effected in these public conveniences in other municipal towns, the disgusting condition of the public latrines here is highly discreditable and inexcusable.

Note by Sanitary Commissioner.

Since the above was written very vigorous action has been taken by Colonel Beadon, Deputy Commissioner of Lahore, and the municipal committee for the improvement of the conservancy of the Lahore city.

Inspection of Mayo Hospital.

Miscellaneous.

On the 2nd of November 1880, agreeably to Punjab Government endorsement No. 2934, dated 9th September 1880, the Sanitary Commissioner inspected the Mayo Hospital, accompanied by Dr. Brown the Principal, who has furnished the former with the following particulars regarding the accommodation:

"There are 4 large and 3 small wards in the main building, and a contagious ward detached, also a padded room. Of the large wards, the two on the lower floor measure 116 feet long by 23 feet wide, and 17 feet high, and are each intended for 24 beds. It is only occasionally, however, that all the beds are filled at one time. The surface dimension of this ward is 2,668 square feet, giving 111 square feet to each bed, or about 10 feet by 11 feet. The cubic space is 45,526 cubic feet, giving 1,896 cubic feet to each patient.

"The 2 large upper wards are slightly smaller, being 115½ feet long by 22½ feet wide, and 16 feet high. They therefore have a surface of 2,598½ square feet, and, if occupied by 24 beds, this would give 108 square feet to each bed. Their cubic contents are 41,580 cubic feet, allowing 1,732 cubic feet to each patient; but these wards are even less frequently filled than the lower, and they have a ventilating roof also.

"Of the small eyewards, one is 18 feet by 18 feet by 16 feet, for 3 patients. It has a superficial space of 324 square feet, or 108 square feet for each, and its cubic dimensions are 5,184 cubic feet, or 1,728 cubic feet for each patient. The other two are each only 13¾ by 20½ by 16 feet, having a superficial area of 282 square feet each, and a cubic space of 4,512 cubic feet, thus giving 1,128 cubic feet for each patient. As these wards are only used for eye cases, this has proved to be enough.

"The contagious ward is 20 feet in each direction, or 400 square feet in surface, or 8,000 in cubic contents. It is built for 4 beds, each of which has 100 superficial square, or 2,000 cubic, feet of air.

"*Ventilation.*—Each one of the larger wards has 16 doors, each measuring 7 feet 9 inches by 4 feet 2 inches wide, so that the opening equals 32 square feet, and in the whole ward there are 512 square feet of ventilating openings. A current of air moving at the rate of only 5 feet 8 inches a minute, or 340 feet an hour, would give 174,080 cubic feet of fresh air to the ward, but the current would probably only go through half the doors, and give 87,090 cubic feet of air per hour to the ward, or 3,268 cubic feet of air to each patient per hour. But besides this there are ventilators above the doors 4 feet 2 inches wide by 9 inches high, and in the upper wards a ventilating roof."

Sanitary Commissioner found the wards everywhere light, airy, fresh, and perfectly free from perceptible odour. They appeared to the Sanitary Commissioner somewhat over-ventilated for the cold weather, but Dr. Brown says that no inconvenience has been experienced, the iron stoves and flues, of which there are two in each large ward, sufficing to keep the air at a moderate and equable temperature.

At the time of Sanitary Commissioner's visit, the hospital contained 75 patients, namely, 47 native males and 15 females, 7 European males and 6 females. The bedsteads are of iron, and each is furnished with suitable bedding, a cupboard, and a set of vessels for food, medicines, and offices of nature. These are all of common porous red pottery, and are, Sanitary Commissioner understands, broken up and thrown away after use by each patient. Each patient has 2 or 3 for food and sometimes more, and 2 or 3 also for medicines. The flat basins, or *gamlahs,* used as spittoons and necessary utensils are not changed so frequently. The number of the smaller vessels expended every month is about 2,400 for both in and out patients, and the number of *gamlahs* similarly expended is about 32. They are supplied by a contractor at a monthly cost of about Rs. 9.

Sanitary Commissioner was surprised to find these very objectionable vessels used in an institution of this kind, glazed-ware, china, and even metal vessels being not only much cleaner, but more economical. Dr. Brown, however, informed the Sanitary Commissioner that the prejudices of the native are an obstacle to the introduction of a permanent set of such vessels and utensils. Whatever the native prejudice may be against eating out of dishes used by others, no such prejudices should be allowed to interfere with the provision of glass or china vessels for medicines and glazed-ware for necessary utensils.

In the latrines the utensils are of glazed-ware and generally well kept, but Sanitary Commissioner noticed that many of the urinals were very foul from want of proper cleansing and dressing with dry earth.

In the verandah passages of the upper wards there is a small gutter along the outer side which discharges at intervals into drainage spouts. In several parts this gutter is out of repair and incapable of proper flushing. The Sanitary Commissioner recommends that this defect should be remedied, as he understands that, despite orders to the contrary, the patients very frequently use this gutter as a public urinal.

The cook-house stands at the rear of the garden behind the hospital, near the well and padded room. It contains 3 separate kitchens for Europeans, Muhammadans and Hindus respectively, and also a separate store room or banniah's shop. Sanitary Commissioner found the whole of this range in a very untidy state, and sadly in want of lime-washing and general repairs. The scullery water and garbage from these kitchens is buried in cup-shaped pits dug in the waste ground immediately in rear. These pits also receive the fallen leaves of the garden which are swept up and so deposited to form garden mould. There is an open drain which conducts from the cook-house through the garden and discharges on to the road immediately outside the compound wall of the hospital on the side near the city. At the time of Sanitary Commissioner's visit there was a long tortuous streak of sludge trickling down this unpaved road. It is formed apparently by bath-room water and kitchen drainage, and, though perhaps devoid of any sewage, is in itself most unsightly and highly objectionable. The nearest brick drain to the outlet of this Hospital drain is that of the Sadr Bazár near the beef slaughter-house and shambles, and its measured distance, Dr. Brown informed Sanitary Commissioner, is 524 feet. The Sanitary Commissioner recommends that these two drains should be connected by a masonry channel.

The waste ground in rear of the hospital is occupied by two bungalows of resident officials, and the foundations of a projected Medical School. For the rest, the area is covered with heaps of stones and brick-bats, and is indented by pits and excavations. Sanitary Commissioner went over this ground a day or two subsequent to his inspection of the hospital, and found it freer from filth than was expected. Yet there were signs of its being used as an easing ground by the residents of the adjoining native quarter, and in some of the pits Sanitary Commissioner found that ashes and rubbish had been recently shot. This ground requires careful looking after. On it, on the day of Sanitary Commissioner's inspection with Dr. Brown, the former found a little Crawley cart. Dr. Brown informed Sanitary Commissioner that this was the only one allowed by the municipality for the service of the hospital. Sanitary Commissioner thinks that one of these carts is sufficient for the requirements of the hospital, so far as the removal of sewage matters is concerned, but he thinks a conservancy cart should also be told off for the service of the hospital, for the daily removal of its sweepings and litter.

Before closing the inspection report on the Mayo Hospital, Sanitary Commissioner feels bound to point out, notwithstanding the excellent work done in its wards, and the science so successfully taught in its lecture rooms, that it does not, as a whole, present the air of smartness and tidiness one expects to find in a first-class institution of this kind. The Surgery, Dispensary, Operating Theatre, and wards generally wore a look devoid of polish and tidiness.

VILLAGE OF CHUNG,

In the Lahore district, inspected on the 23rd November 1880.

Preliminary remarks.

Chung comprises the separate, though closely adjoining villages of Maniwal Chung, and Panjgirain. The site is flat and open, and lies between the trunk road and the river Ravi, and about 200 to 500 yards from either. The drainage of Maniwal is to the river by rough water-worn gullies. Cultivation is close up to the village precincts, and there is a good sprinkling of trees about. The Police Station and Dák Bungalow face each other on opposite sides of the high road and about 300 yards from the Chung village.

Chief Sanitary defects and suggestions.

The surroundings of the village are on the whole remarkably free from pits and excavations of any great size or depth, as well as from dung-heaps. There were, however, some of each, both outside Maniwal and Chung. The Sanitary Commissioner suggests that the dung-heaps should be collected at appointed sites at least 200 yards away from the village. The shallow pits outside Maniwal might be easily filled up by ploughing the ground into it, and levelling it with the harrow.

The watering-trough of the main well in Chung is in a horribly dirty state and is recommended by the Sanitary Commissioner to be cleaned out at once. Parapets and platforms should be provided for the two wells without them.

There is no systematic scavenging. The villagers collect their sweepings, cattle-litter, &c., in private manure heaps, usually in their own cattle yards, or close outside the village. Sanitary Commissioner found the lanes and environs remarkably free from objectionable sights or smells.

Water-supply.

The Ravi river flows a few hundred yards to the west of the site. The water-supply is from wells of which there are 5 for drinking purposes, all with red brick masonry tubes about 8 ft. in diameter, and 17 to 19 ft. to surface of water, which has a depth of from 7 to 9 feet. The water is hard but considered wholesome by the people. Two of the wells are without parapets or platforms, but the other three are well provided in this respect. The cattle trough of the main well in Chung had a filthy black deposit which on being stirred emitted sulphuretted hydrogen very freely.

Remarks by Sanitary Commissioner.

The attention of the lambardárs should be called to the neglect of the rules for collecting litter and sweepings at the sites fixed outside the village. Most of the villagers could easily carry their house-sweepings to these manure godowns or storage sites, but it requires a little pressure on the part of the village headmen to get the practice fairly started.

WAZIRABAD TOWN,

Inspected on the 23rd March 1881.

Preliminary remarks.

The town is described in the Sanitary Report for 1878, page 76. Since that date some few improvements have been effected. But in other respects the graver sanitary defects of the situation remain unchanged.

Chief Sanitary defects and suggestions.

Streets and drains.

One-half of the main street of the town has been remetalled and provided with a good roadway for cattle and wheeled traffic, and a roadway on either side for foot passengers along the lines of shops. These roadways are separated by two parallel lines of superficial gutters laid down last year, Sanitary Commissioner is informed, by the Deputy Commissioner, Mr. Roberts. These gutters are of the old angular pattern, and should not have been laid down without consulting this office. No drains other than with elliptical channels should ever be laid down, as it is impossible to keep the angular ones in a wholesome state owing to the sewage sticking in the angles. Apart from this defect the new road is a great improvement, so far as it goes. But the work has been done on no system. Unless the municipal committee are utterly indifferent as to how their funds are spent, they will at once have a plan of their town made with the levels clearly marked, and also a comprehensive plan for the drainage of the town to be completed in sections as money is forthcoming. Sanitary Commissioner thinks it may be found practicable to conduct the drainage or sewage of the town by a circular drain in a direction away from the Palku rivulet, and there to utilize it in field irrigation. This point can only be determined after survey of the ground.

System of sewerage, drainage, &c.

The drainage and sewerage are in the same state as described in Sanitary Commissioner's previous report. The conservancy establishment is on the old footing, and thet own-sweepings are disposed of to a contractor at the nominal price of Rs. 38 a month or Rs. 456 a year, the real value of the stuff being fully twelve times that amount. Some of the members of the municipal committee, Sanitary Commissioner understands, get this manure free of cost for their fields around the town to the distance of 2 or 3 miles. If this is really the case (Sanitary Commissioner's information was merely hearsay on the spot) it is by no means creditable conduct on their part. These guardians of the municipal interests should not be allowed to betray their trusts for the sake of personal advantage at the cost of their fellow-townsmen. The conservancy of the town can never be efficiently performed so long as this system is allowed to continue. Sanitary Commissioner found quantities of litter and rubbish everywhere, both inside and outside the town, owing to careless scavenging, the sweepers thinking more of loading their asses than properly sweeping the streets. The introduction of manure godowns would at once remedy the existing evils by providing established sites for the collection of all sorts of filth and refuse matters. But it is hopeless to look for any improvement unless the municipal committee devotes its serious attention to the subject.

Water-supply.

Many complaints were made to the Sanitary Commissioner of the deteriorating quality of the well water. It was found to be less digestable than before, though no cause is alleged except the stagnation of the water in the Palku rivulet consequent on the diversion of the annual flood by an embankment in connection with the Railway. Sanitary Commissioner would recommend an analysis of the water of the principal wells being made and an enquiry instituted into the feasibility of producing a current in the Palku rivulet. Sanitary Commissioner found its water, both above and below the Railway bridge, in a stagnant and foul state, and especially at the spot where the great drain of the town discharges into it.

Cremation and burial grounds.

Since Sanitary Commissioner's last report the site of the Hindu cremation ground has been altered, and on the occasion of his visit some of the members of the municipal committee represented their objections to the new site selected on account of its being outside the limits of the town land and not so conveniently situated as another site which they wish to be assigned for this purpose. Sanitary Commissioner visited both sites, and considers both are much better placed than the original site. It was not clearly explained to Sanitary Commissioner on what grounds the site on the east bank of the Palku stream, and in the Bhatti village limits, was selected, beyond the statement that the residents in the Mission compound object to the site on the west side of the stream, where the Hindus of the town wish it to be, on the grounds that it is a religious ordinance with them to dispose of their dead when possible within the limits of their own land. As regards the objections attributed to missionaries, it appears to the Sanitary Commissioner that they are equally applicable to both these sites, whilst on sanitary grounds, coupled with those of convenience, Sanitary Commissioner thinks the site on the west bank is the preferable of the two.

Miscellaneous.

After inspection of the town, Sanitary Commissioner addressed the members of the municipal committee on the chief points requiring their attention, and dwelt on the importance of their making arrangements for the more efficient and economical working of their conservancy establishment, and they promised to adopt the measures suggested by Sanitary Commissioner for the systematic collection of town-sweepings, filth, &c., in mud wall enclosures (Khád gudam) at convenient spots round the town outskirts, and for its sale there as manure or fuel material. Sanitary Commissioner will be glad to receive their report of the measures taken to effect these objects, as soon as they are set agoing.

Sanitary Commissioner's remarks.

Recommends that the Deputy Commissioner be asked to consult with the municipal committee on the best means of carrying on the conservancy arrangements proposed, and suggests that reference be made to report on this town printed on pages 76 to 78 of the Sanitary Report for 1879 for the attention of the municipal committee to the other points there indicated as requiring remedy.

Requests that a report of the steps taken may be furnished to this office.

GUJRANWALA TOWN,

Inspected on the 25th March 1881.

Preliminary remarks.

Gujránwála is on the line of Railway from Lahore towards Peshâwar, and occupies a level spot which lies somewhat low. The vicinity of the town is much indented by deep excavations of the soil which become filled with water during the rains. The town is surrounded by a circular road and is traversed by three or four wide streets which afford ventilation to the interior. Sanitary Commissioner found the streets, bazárs and environs on the whole in a fair state of cleanliness and order; some special points calling for attention are noticed in the report.

Chief Sanitary defects and suggestions.

Streets and drains.

The town is paved and drained throughout. In the main thoroughfares the streets are metalled and the drains run at each side as open surface gutters; in the lesser streets the roadway is paved with bricks on edge and the drain courses down the centre of the roadway which itself is crossed at intervals by streaks of sewage from the private houses on either side. These drains and gutters are everywhere of the old patterns, *i.e.*, they have angular channels, and in many places are much in want of repair. The municipal committee have no plan or map of the town. It is very advisable that a plan of the town and suburbs showing all its streets with levels should be prepared, and also a plan and estimate of a comprehensive scheme of sewerage and drainage in connection with the existing drains so as to connect all by one circular outfall drain in view to the utilization of the sewage for irrigation purposes.

System of sewerage, drainage, &c., &c.

The present sewers and drains of the town, all open surface gutters, empty by four or five main drains into the depressions round the outskirts of the town. These main drains might be easily connected by a circular drain and the sewage led away from the town and utilized for irrigating cultivation as is done at Amritsar. The conservancy arrangements in force are very unsatisfactory, and entail loss of several hundred rupees a year upon the Municipal Funds, and at the same time fail to produce as complete a scavenging as is possible. Under existing arrangements the town-sweepings, filth, &c., are removed by a contractor whose donkeys and bullocks are allowed to ply in the streets up to noon daily. For this privilege the contractor pays the municipality the sum of Rs. 600. The stuff he removes is worth at its market value about eight times as much at least. It appears that efforts have been made to work the conservancy by the direct agency of the municipal sweepers, and a number of carts (*viz.*, 2 conservancy, 8 Crawley and 4 urinal carts) were purchased at considerable cost by the municipality, but they have never been used, and at the time of Sanitary Commissioner's inspection were drawn up outside one of the main gateways, apparently there to fall into decay. Sanitary Commissioner is not exactly informed as to the causes which have led to the failure of the municipal efforts, but has ground for believing that the personal interest of the members of the municipal committee who benefit by the present arrangement are a stumbling-block in the way of improvement.

Water-supply.

From wells of which there are 118 worked by rope and bucket, and 2 by wheels, within the circular road round the city. The water is generally considered of wholesome quality. Many of the well platforms require parapets to prevent spilt water re-entering the wells. The cisterns connected with several wells also require repair, and to be built up on the surface and not sunk below it. Most of the wells require waste water conduits to connect them with the nearest street gutters. There are also two tanks outside the town, both fed from the surface drainage of the surrounding land. The tank near the town hall is in a horribly foul state, and it is surprising that people can be found willing to befoul themselves with such filth, yet Sanitary Commissioner saw some 20 men and 6 or 8 women bathing and washing their clothes in the filthy water. Sanitary Commissioner sees no easy and ready means of remedying the evil, except by flooding the tank from wells ; this would dilute the present strong solution of dirt of sorts. But the most effectual and proper remedy is to bale out the contents, clean the tank, give it a good coating of lime-wash, and then re-fill, not from the surface drainage of a dirty area used as an easing ground, as is now the case, but from wells in the vicinity. The well has a ghát for watering cattle; this should be built to a height of 2½ feet or so, and formed into a cistern and watering-trough so as to prevent the cattle entering the tank at all.

Latrines.

There are 4 pucca latrines ; their soil is buried in trenches in adjoining fields, and is thence dug up when deodorized and sold as manure. But it does not appear to be done economically or systematically. The latrines are roofless rows of compartments and are provided with a store-room for dry earth. They are at a considerable distance from the town, and the one seen by Sanitary Commissioner was apparently not much frequented.

Slaughter-yards.

There is one for beef behind the dispensary, and a slaughter-yard for goats and sheep adjoins it. These are on the west of the town. There is a larger slaughter-yard for goats and sheep behind Maha Singh's garden on the east of the town. Sanitary Commissioner found the former in a well-kept condition, but the ground about it, which is much excavated, was covered with several heaps of filth and manure material going to waste.

Cremation and burial grounds.

There is a good cremation-ground enclosed within walls to the east of the town near some large brick-kilns that stand on the edge of some very extensive excavations. There is a cemetery on the south of the town, situated between the Nowshera and Mian Singh Kila roads.

Miscellaneous.

There is no doubt that the municipal income can be considerably increased by the systematic collection and sale of town sweepings and filth, &c., as a monopoly. The advantages of this measure are twofold, *viz.*, a steady source of income and a vastly improved conservancy. But to insure this proving successful, the members of the municipal committee must in the first place devote their attention to the efficient organization of the necessary details, and they must forego any personal benefits they may individually derive from the present system at the expense of the interests of their fellow-townsmen. There is a great demand here for town-sweepings, &c., as manure, and as fuel for brick-kilns. If the municipal committee monopolize all this stuff, collect it as a marketable commodity, in godowns established at suitable distances round the town, and there sell it, they will confer a benefit upon the town and its people to their own credit and the public welfare.

Remarks by the Sanitary Commissioner.

Recommends that the earnest attention of the municipal committee be called to the very filthy and dangerous state of the tank mentioned in this report (Mayah Singh's Tank), and also to the suggestions regarding the reorganization of the conservancy arrangements on a more efficient and profitable system than that now in force, by which a number of conservancy carts in excellent order are allowed to be idle and go to ruin. The state of the wells in respect to parapets and waste-water conduits, &c., also requires careful attention.

TULAMBA TOWN,

In the District of Mooltan, inspected on the 6th December 1880.

Preliminary remarks.

The town stands on level ground about three miles from the eastbank of the Ravi, and is surrounded by waste jangal tracts.The Mooltan and Lahore road passes close under the east side of the town, which is more or less enclosed by walls for octroi purposes, and is entered by six gates and five wickets. The streets are mostly paved with bricks, and are furnished with superficial side-gutters. The drainage is all to the westward, where it collects in a large hollow about 300 yards from the town walls.

Chief sanitary defects and suggestions.

Streets and drains.

The streets are in most parts paved with bricks on edge, and furnished with gutters at each side. These are mostly of use for rain waters, as there is no flow of liquid sewage, the people bathing at the wells. Sanitary Commissioner found the streets in a remarkably clean state and the air free from smells.

System of sewerage, drainage, &c.

The Committee are vigilant in seeing to the cleanliness of the streets, and that litter, sweepings, &c., are carried away to the fields or appointed storage sites. There are two of these latter about 300 yards from the walls to the north-east and south-west. Sanitary Commissioner found the town generally very clean and well swept.

Water-supply.

Wells only. There are altogether 11 wells in municipal limits, and of these 8 are inside the walls. All have masonry tubes. The water of all the wells is sweet and considered wholesome, except of one built in Thakurdwára Bazár about eight years ago by Government.

Cremation and burial grounds.

Cremation-ground is on the bank of the old bed of the river, 1½ miles from the town. The burial-ground for Musalmans is about a mile to the west of the town, and that for menial castes a few hundred yards beyond the serái.

Remedial measures.

More thorough and effective scavenging, improved accommodation for cattle, and removal of all refuse, litter, sweepings, &c., to fixed and properly prepared sites at convenient distances outside the town.

Miscellaneous.

The committee represent that the conservancy establishment, which was reduced from 6 to 4 sweepers some years ago, is now overworked, and recommend that it be raised to the previous strength. Sanitary Commissioner thinks the present establishment is underhanded, and recommends the increase proposed, especially as public latrines are not in vogue here.

MOOLTAN TOWN,

Inspected on the 14th and 15th December 1880.

Chief sanitary defects and suggestions.

Streets and drains.

Only the main bazárs and streets were paved at the time of the earlier inspections, all the smaller streets and bye-lanes being left untouched. These latter were in a very filthy state from neglected scavenging, and in the rains become very offensive owing to the formation of numerous cesspools. Most of these were taken in hand during 1878-79 and 1879-80, and 40 of them were paved and drained at a cost of 23,000 rupees, and the condition of many of the rest has been much improved by a more efficient scavenging. There is still however great room for further exertion in this direction. The municipal committee has decided, before any more paving and draining is taken in hand, to have accurate levels taken of the whole of the city with the view to the preparation of a proper system of drainage and paving. A surveyor has been engaged for this duty, and was employed on the work at the time of Sanitary Commissioner's visit. Sanitary Commissioner would recommend that a competent engineer be employed for the preparation of a comprehensive scheme of sewerage by surface gutters, and an outfall sewer to include the whole city area.

System of sewerage, drainage, &c.

At present there are 5 large sewers and a number of smaller ones which all empty into the old line of fosse surrounding the city. The larger streets have gutters on each side, the smaller ones on only one side. They are all connected with the main sewers, but in many parts the gradients are very defective and cause stagnation. The gutters of the larger streets are flushed daily from wells by the bhisti establishment; those of the lesser streets every second or third day. The conservancy is managed after a peculiar fashion, which is by no means effective—by the agency of two separate establishments, one of sweepers, and the other of bullockmen. The sweepers take up only night-soil or ordure, which is collected at certain spots in the different quarters of the city, and there load it into the bullock panniers. When these panniers are filled, the bullockmen drive their laden cattle off to the sites selected for depositing filth. There are three such sites, *viz.*, at Bishadi Lal, at Ram Tirath, and at the Idgah. At these places deep trenches are dug in parallel lines, and into these the filth is thrown, and when full the trenches are covered over with earth. In about four months the stuff becomes deodorized, and is then sold as manure at Rs. 2 per 100 bullock-loads, the purchaser digging it out at his own cost. There are about 25 appointed sites in the city from which the municipal sweepers load the filth, &c., collected there from private dwellings by household sweepers. They have nothing to do with stable litter but only night-soil and house-sweepings. The private sweepers of the several householders carry away the stable litter, &c., as manure for the fields. The bullockmen on the average make two journeys a day each to the filth pits, that is to say, each bullockman carries two loads of filth daily from the city to the pits. This arrangement being found ineffective and very expensive, a scheme was drawn up for the re-organization of the conservancy establishment on the model of that which has been worked so successfully at Amritsar, but the native members of the municipal committee not favoring it, the scheme was laid aside for future deliberation and action. It appears from all Sanitary Commissioner can learn that the personal interest of the native members of committee and other native gentlemen of the city is involved in this improved conservancy scheme. At present they employ sweepers or cultivators to remove this stuff from their houses to the fields outside the city as manure, but this removal is effected only when and to the extent that it suits the convenience of each individual cultivator, nor is it in any way connected with the scavenging of the city, for these people do not even clear up the litter and mess they make in loading the manure.

It is very important and highly desirable that this question should be specially considered and thoroughly investigated at specially convened meetings of the committee. Sanitary Commissioner understands that the night-soil sold by the municipal committee realizes only about Rs. 300 a year. In a town of this size it ought, if carefully monopolized and economically collected, to fetch a much larger amount and in fact very nearly enough to pay for the cost of the conservancy establishment which need not be on its present expensive and inefficient scale. Sanitary Commissioner would recommend that this subject be carefully gone into by the municipal committee with the view to arranging for the collection of all the filth, litter, sweepings, offal, ordure, rubbish, and in fact everything decomposable of the kind, by municipal agency on a regular and organized system for the whole city, and later on the suburbs also. By this means the city conservancy will be much improved and the filth removed be economically collected and stored for sale for the benefit of the Municipal Funds. Sanitary Commissioner thinks four enclosed sites at convenient distances from the city-gates on as many sides should be appointed, and into these should be cast everything decomposable, street sweepings, kitchen refuse, stable litter, night-soil, ordure, latrine filth, urine, dead cattle, &c., and there left to accumulate and decay till required for manure or kiln fuel. By this plan the expense of trenching latrine soil and burying dead cattle would be saved. If the carcasses of dead cattle were found to taint the air by putrifaction, this could be at once remedied by burning them by setting alight the straw and litter about them.

These manure stores should be of sufficient area to receive a large supply of filth and rubbish, and should be enclosed by low mud walls 2½ or 3 feet high to limit the site on which filth may be cast, and to protect the stuff from surface drainage and dispersion by passing cattle, &c. The sites should be on elevated ground in preference to low land, and, if possible, away from any source of water-supply. Once prepared and enclosed, these sites should be the receptacles of every sort of manure material removed out of the city, and their contents should be sold systematically for the Municipal Funds. With a little arrangement, care and economy, the proceeds of sale of this stuff would not only suffice to pay the cost of the requisite conservancy establishment, but also leave a margin of profit to credit of the Municipal Funds.

Water-supply.

From wells. There are about 1,000 both inside and outside the city and within municipal limits. All of them contain sweet water which is popularly considered of good quality. All the wells within the city are cleaned out yearly during the months of May, June and July. During the rainy season, when the canals about the city are in full flood, the water in the wells rises from 1 to 3 feet. Many of the wells in the city have defective parapets, and were in a very foul state around them owing to the want of conduits for spillings. Some were furnished with sinks to catch waste water and spillings, and these were also in a foul state from want of regular cleaning. The city wells generally require to be taken in hand and their parapets and surroundings put into proper order. Most of them are so situated as to be furnished without difficulty with drain conduits connecting with the street gutters. The sinks of several of them are quite unnecessary and faultily placed.

Latrines.

There are 19 altogether, of which 5 are for women. All of them were repaired during the year 1879-80, and are now in good condition so far as the buildings are concerned, but they are roofless and without utensils of any kind. They are dressed with dry earth, but no provision is made for the storage of this earth. The one examined by Sanitary Commissioner was in fair order, and had a copious layer of dry earth spread over its floor. In rainy weather it would be a disgustingly foul mire.

Slaughter-yards.

There are two for goats and sheep, one near the Pak gate, and the other near Kotla Fath Khan. Both have been thoroughly repaired recently. Sanitary Commissioner examined the former and found it in good order. When the manure godowns are established, the offal, &c., from these slaughter-houses should be added to their general contents.

Cremation and burial grounds.

There are 7 burial-grounds for Muhammadans, of which 5 are within municipal limits and 2 beyond. Some of the former are quite close to the city. They are generally well kept. There are 2 burial-grounds for Hindu children, and a cremation-ground also. The latter is a mile beyond the Delhi gate, and one of the burial-grounds (Kalawala) is close to it; the other (Bhirshi Lal) is near the Railway Station. They are not enclosed, and might be so with advantage.

Miscellaneous.

The municipal income for the past year was as follows:—

Octroi Rs. 80,000; Tax on vehicles Rs. 700; Rents Rs. 160; Miscellaneous from fines Rs. 300; Produce of gardens Rs. 580; other items, sale of manure, tree loppings, &c., Rs. 500. Total Rs. 82,240. Of the last amount only about Rs. 300 was derived from the sale of manure. From the statement furnished Sanitary Commissioner by the Secretary, Municipal Committee, the 82 bullockmen make on the average 2 journeys a day to the filth pits,—*i. e.* Rs. 164 loads of filth are daily deposited in the pits or Rs. 59,860 loads annually, at a yearly cost to the municipality of Rs. 5,904 for carriage. The manure, when deodorized, is sold at the rate of Rs. 2 per 100 bullock-loads. Sanitary Commissioner understands that the pits are yearly cleared out at this rate, but the municipality realize only Rs. 300, or the price of 15,000 loads. It appears therefore that the municipality loses a considerable sum of money annually for want of proper supervision of the manure sold at the pits. It is a still greater loser by collecting into these pits or trenches only night-soil and garbage, all stable refuse and litter being left to private enterprize to remove. With good management and careful collecting the municipality, with the existing demand for manure here, ought easily to realize at least Rs. 10,000 a year by sale of its town filth and sweepings, &c., a sum sufficient to pay the cost of the entire conservancy establishment.

Remedial measures.

The town urgently needs to be scavenged in a more thorough and systematic manner. Its drains and sewers also require to be altogether remodelled on a comprehensive and uniform system, so as to convey away the sewage in a single outfall channel and utilize it for field irrigation.

Remarks by Sanitary Commissioner.

The subject of city conservancy requires the earnest and serious attention of the municipal committee with the view to its being put into an efficient state and made partially, if not wholly, self-supporting by sale of the city sweepings and refuse. The present state of the conservancy arrangements is discreditable to the management of the committee. The re-organization of the sweeper staff and the establishment of manure godowns should receive early attention.

The parapets and sinks connected with many of the city wells require repair and remodelling. Conduits for waste water in connection with the street gutters are preferable to the sinks now in use.

The work of taking the levels of the streets preparatory to the projection of a scheme for the sewerage and drainage of the city which is now in progress should, I think, be done by a competent engineer as part of the proposed project.

Note by Sanitary Commissioner.

A report has been recently furnished to this office by the Secretary Municipal Committee, Mooltan, showing the action proposed to be taken to improve the present conservancy arrangements in this city.

SHORKOT TOWN,

In the District of Jhang, inspected on the 7th December 1880.

Preliminary remarks.

The town lies low at the foot of an extensive mound formed by the ruins of an ancient city, and is surrounded by a belt of hollow land which is inundated for three or four months during the rainy season of each year. The site is overlooked on the west by the mound referred to, and on the other sides is more or less closed in by date-palm and other trees, and cultivation. The Tahsíl and camp ground lie some way off to the south, and a raised causeway conducts from them across the low ground to the town. The houses are poorly built of mud and brick. The surface soil is a stiff compact clay.

Chief sanitary defects and suggestions.

Streets and drains.

The streets, except small lengths of one or two and the main bazár, are unpaved and undrained. The rain waters rapidly flow off into the hollow ground above mentioned. Sanitary Commissioner found the streets and courts had been well swept prior to his arrival, but there were heaps of refuse and rubbish in all directions in corners, waste spots, and pits. Near the dispensary is a tank fed by a cut from the river Chenab. It is a mere excavation in the ground and was in good order at the time of Sanitary Commissioner's inspection.

System of sewerage, drainage, &c.

There is no systematic arrangement for either. The two first do not, from the nature of the case, require immediate attention, but the conservancy calls for prompt and effective treatment. Sites have been appointed as storage places for refuse, sweepings, &c., but they have not yet been enclosed or put into use. They should be at once prepared and walled in, and publicly notified as the only places in which filth and sweepings, &c., may be cast.

Water-supply.

From wells. There are 11 inside the town, of which 4 are more or less in ruins and unused, and 2 are used for irrigation also. There are 17 wells outside the town used both for drinking and irrigation. The water is clear, sweet and soft, and considered good; its height is not affected in the rainy season.

Latrines.

There are four public latrines here, all of the same pattern—mud-wall enclosures divided into equal parts for men and women by a partition-wall. Each part is divided into compartments which are roofless and unprovided with any sort of utensils. These latrines are placed too far away from the town, and are little resorted to. The one Sanitary Commissioner saw on the east side of the town is fast falling to ruin.

Cremation and burial grounds.

These are well removed from the town, and on the far side of the belt of low land which is yearly inundated. One grave-yard is on the north-western and the other on the north-eastern side of the town, and both are in good order though unenclosed. The burning-ground is a mere open space beyond the grave-yard to the north-west, and is about half a mile distant from the town.

Remedial measures.

Improved and separate shelter for cattle. A more thorough scavenging of the town, and prohibition of the formation of dung-heaps within its inhabited area. The appointment and preparation of fixed sites (by enclosure within low mud walls) for the collection of cattle litter, house and street sweepings, and all manner of refuse and rubbish. These sites should be at convenient distances outside the town and opposite its several outlets.

INSPECTION REPORT OF MAGHIANA *cum* JHANG,

In the district of Jhang, inspected on the 14th February 1881.

Preliminary remarks.

These towns have been recently inspected and reported upon by the Civil Surgeon whose recommendations had been brought to the notice of the municipal committee, and were at the time of Sanitary Commissioner's visit receiving the careful attention of the committee.

Chief sanitary defects and suggestions.

Streets and drains.

Sanitary Commissioner found both towns in a very creditable state of cleanliness, especially Jhang. In Maghiana Sanitary Commissioner had occasion to point out to the members of the municipal committee some oversights on the part of the Conservancy Inspector in respect to thorough scavenging of the streets, and has no doubt that a more careful supervision on his part will remedy the defects alluded to.

System of sewerage, drainage, &c.

These have been described in the Civil Surgeon's report. Sanitary Commissioner thinks it advisable that the municipal committee should establish low mud-wall enclosures as manure godowns for the reception of all manner of refuse matters, such as house-sweepings and latrine ordure, slaughter-house offal, &c., &c. The stuff to be sold as manure or kiln fuel for the benefit of the Municipal Funds.

By a more careful supervision on the part of the Conservancy Inspectors a greater quantity of refuse matters may be easily collected in the manure stores than is at present the case, with the twofold advantage of a more complete scavenging and more abundant material for profitable sale. Sanitary Commissioner explained this matter in detail to the members of the municipal committee and others who accompanied him in his inspection.

Water-supply.

Every well should be provided with a waste-water conduit to the nearest street drain. The wells used for bathing purposes should be provided with bathing-places enclosed within walls, separate wells to be set aside for male and female bathers.

Latrines.

These require much repair and remodelling. Sanitary Commissioner understood from the Civil Surgeon and the municipal committee that the subject was under consideration and that these places would soon be put into proper order. Sanitary Commissioner suggested that those for males be provided with light roofs supported on low props for free ventilation, and that those for females should have an open verandah roof along one side. The arrangements for the dry-earth services of these places, as explained to Sanitary Commissioner by the Civil Surgeon, were satisfactory.

Remarks by Sanitary Commissioner.

Recommends that the Deputy Commissioner be asked to communicate the remarks made by Sanitary Commissioner in this report to the municipal committee with the view to their considering the several points dealt with. The conduct of Assistant Surgeon Chetan Shah in encouraging the people to accept sanitation and vaccination on intelligent principles is deserving of great praise, and I would strongly recommend him for the favorable notice of Government for some token of appreciation of his zeal and diligence.

INSPECTION REPORT OF GOGAIRA,

A village in the Montgomery District, inspected on the 29th November 1880.

Preliminary remarks.

The village is situated about a mile from the Tahsíl, and stands on slightly elevated ground surrounded by a succession of excavations all of which are flooded in the rains. Sanitary Commissioner found most of them dry and only three containing water. The Civil Station around the Tahsíl was removed to Montgomery when the Railway to Mooltan was opened, and its site, now marked by dismantled bungalows and avenues of trees, is under cultivation irrigated by wells. The station bazár is now occupied by the officials of the Tahsíl establishment. Sanitary Commissioner found it in a very fair state of cleanness, and well swept.

Chief sanitary defects and suggestions.

The village of Gogaira wears a decayed look and is altogether neglected as to conservancy. The rule regarding the disposal of sweepings and refuse at fixed sites outside the village has not been adopted here. It should be enforced without delay, and the accumulation of dung-heaps in and about the village be strictly prohibited. The throwing of sweepings, &c., on to the sides of ponds and other excavations round the village is a very objectionable practice and should be prohibited.

There is no conservancy in this village. Sanitary Commissioner found the streets and courts very neglected in this respect. In almost every court and at many spots round the village, Sanitary Commissioner found heaps of rubbish, litter and ashes, and some of them of very long standing and considerable size. After being well soaked with rain, these heaps of decomposable matters must very seriously pollute the air of the place with unwholesome exhalations.

Water-supply.

From wells. There are 5 inside the village and 27 in the fields around. Two of the first lot and 14 of the second are out of use. Sanitary Commissioner found the 3 in the village in fair order. The water is clear and soft, and considered to be of good quality. The river Ravi flows about 2 miles to the west of the village, and when its stream is in flood, the wells in the fields become full to the brim in those near the river, and less so as the distance increases.

Remarks by Sanitary Commissioner.

The rule regarding the storage of house-sweepings, cattle-litter, and rubbish generally at fixed sites (mud-wall enclosures) outside the village is neglected. It is vain to look for any material improvement in the salubrity of the village so long as these masses of decomposable matters are allowed to accumulate in its courts and alleys to contaminate the air with fetid exhalations as soon as they become saturated by rain. There is no reason why the evil should be allowed to continue. The people I believe would gladly accept the new system if it were only enforced by order of the local authorities.

There are 6 families of curriers who cure hides in their own courts in different parts of the village. This was mentioned to me as a nuisance by the patwári and some of the lambardárs. This trade should not be allowed to be practised inside the village precincts.

MUZAFFARGARH TOWN,

Inspected on the 17th December 1880.

Preliminary remarks.

There is nothing to add to the description of the town given in the last report. On this occasion Sanitary Commissioner found the streets and alleys and the town generally in a remarkably clean state, and entirely free from objectionable odours and sights, with the exception of some dung-heaps on the outskirts. The general conservancy of the town is very creditable to the supervision of the municipal committee. Sanitary Commissioner would invite their attention to the removal of the dung-heaps on the outskirts of the circular road, and the advantage of at once establishing manure godowns at fixed sites with the object of collecting all refuse matters for sale as manure to the profit of the municipality.

Chief sanitary defects and suggestions.

Streets and drains.

The main streets are paved and drained with bricks. Several of the alleys and side-streets have been paved since last report. These have the roadway laid with bricks in a concave form like a wide shallow drain. A large *nand*, or pottery bowl, is set down at a convenient spot in the lane to serve as a sink, into which the houses around empty their slops. At fixed hours these vessels are emptied by the municipal sweepers and the water thrown into a street gutter or carried outside the town and thrown on to the fields.

System of sewerage, drainage, and conservancy arrangements in force.

The town drains discharge their sewage by three or four outfall drains in different directions on to low ground immediately outside the town. To the north, the sewage is discharged into a stagnant pool; to the south into a ditch which is in the midst of cultivated fields; and to the east on to the public roadway. Solid filth and sweepings are removed by conservancy sweepers to the fields, but there are many collections of litter and filth close about the town. Manure godowns have not yet been established. The town-sweepings were sold this year for Rs. 65 only. The municipal committee with careful management might realize, at least, Rs. 500 from this source annually. The sweepers remove the town-sweepings, &c., on donkeys to different sites outside the town, and often direct to the fields as manure. There is much to be done towards a systematic collection of all manner of town filth for profitable sale as manure. The present establishment appears to be sufficient for the requirements of the town, and might be made self-supporting by the sale of the stuff they collect. It is the intention, Sanitary Commissioner understands, of the municipal committee to take up this subject of the town refuse as a means of Municipal income. This is a step in the right direction.

Latrines.

There are only two latrines, both for women. They consist of mere walled enclosures divided into four or five spacious compartments or courts, the ground of which is used without further preparation. The sweeperess attached to each removes ordure from the surface daily. Sanitary Commissioner examined the one on the west of the town, and found it in fair order, though the air was tainted by odours from the saturated soil.

Cremation & burial grounds.

There is one burial-ground at the shrine of Ghaus Hamza about 100 yards from the northern gate of the city. There are two burning-grounds on each side of the Ganeshwah canal about 150 or 200 yards east of the city. Both burial and burning grounds are beyond municipal limits.

Remedial measures.

There are difficulties in the nature of the site which render the disposal of the sewage at a distance from the town a difficult matter. The sewage of the east outfall drain might, Sanitary Commissioner thinks, be conducted away from the road into the adjoining cultivation, as has been done with that on the south of the town. It is intended to pave all the lanes and side streets as the funds become available. Some of the bye-streets have already been paved in the form of wide shallow drains. It is preferable to lay down convex roadways everywhere with a gutter on one side in the small streets, and on both sides in the large ones.

Remarks by Sanitary Commissioner.

The town generally is in a creditable state of cleanliness so far as concerns the conservancy of the streets. The municipal committee expressed their intention of establishing manure godowns, and the Deputy Commissioner, Mr. O'Brien, informed me that he would take up the subject at an early date. I would suggest that the Deputy Commissioner be asked to report to this office the nature of the new arrangements made in this matter, and the date on which the selected sites are enclosed as manure godowns.

KHANGARH TOWN,

In the Muzaffargarh District, inspected on the 10th January 1881.

Preliminary remarks.

The town was originally a fort. It is now enclosed within the old line of ramparts and surrounded by a belt of suburban tenements which occupy the low ground around. The town is situated about 3 miles from the river Chenab on an alluvial plain which is intersected by numerous branches of two main canals from the Tileri Canal. The site of the town is slightly raised above the general level of the plain, and is surrounded by a circular road which is unpaved. There is a main bazár which divides the town from north to south into two parts. It is paved and drained. The side-gutters drain to north and south from a central water shed. Sanitary Commissioner found the gutters in a foul state and with running sewage which empties into fields beyond the circular road by a long tortuous channel winding along its roadway and emitting a foul odour. There are other drains which empty across the circular road on to the fields on the east and west of the town.

Chief sanitary defects and suggestions.

Streets and drains.

Only the main bazár is paved and drained. All the side streets are unpaved. The sewage from the northern part of the main bazár empties northward into some fields beyond the town by a tortuous foul channel along the centre of the circular road. This channel is in a foul state with sludge, and irremediable except by abolition. The gutters of the main bazár should be continued on to the fields beyond the gate along the side of the main road. There are other drains emptying on to the circular road on the south-east and west sides. They all require repair and extension to a suitable distance away from the town.

System of sewerage, drainage and conservancy arrangements in force.

There is no system of sewerage. The conservancy arrangements are also very faulty. The conservancy sweepers take up only the sweepings of the streets and leave them in heaps along the roadside for the contractor to remove, together with the house-sweepings, &c., put out from the houses. For this stuff the contractor pays Rs. 13 a year. The committee told Sanitary Commissioner that he took away about 20 bullock-loads daily, and that the market rate of the manure was 20 loads the rupee, so that he made Rs. 365 for his Rs. 13 even on this admission; the probability being that he removes fully 40 loads a day from the 700 inhabited houses. The conservancy establishment is not well worked and might with advantage be increased by the addition of three or four more sweepers. Sanitary Commissioner spoke at length to the members of the municipal committee on the advantages both in a sanitary and a pecuniary sense of collecting all the town refuse into manure stores, established at fixed convenient sites, and its sale as manure or fuel for the benefit of the municipal funds. They all admitted the force of Sanitary Commissioner's argument, but were nevertheless not very eager to adopt the proposal. They promised, however, to take the subject into consideration and give Sanitary Commissioner's recommendations a trial. Sanitary Commissioner shall be glad to hear what measures the municipal committee have adopted in this respect, and he has no doubt in his own mind of the success of the measure if it is honestly worked out for the benefit of the municipality and independently of private interests and profits now unwarrantably derived by some at the expense of the town.

Water-supply.

From 41 wells. Most of them were worked by wheels, and require more or less repair. The wells should all be provided with proper parapets and waste-water conduits, and those at which cattle are watered with watering-troughs. The waste-water conduit should drain the watering-trough and empty into the nearest street gutter.

Latrines.

No latrines now exist. Two formerly built have fallen to decay. The construction of two latrines for females—mere walled enclosures with a covered verandah on three sides as shelter from the weather and protection to the dry-earth dressing—might be provided with advantage. The ordure of these should be added to the contents of the nearest manure store.

Slaughter-yards.

Outside the town on the west side. It is a mere enclosed space and is kept fairly clean by the municipal sweepers. The offal, blood, &c., of this place should be added to the contents of the nearest manure store.

Cremation and burial grounds.

There are several burial-grounds, but only one is within municipal limits. The burning-ground is about half a mile to the east of the town, and beyond municipal limits. It is not enclosed.

Remedial measures.

Improvement and extension of present drains, and more efficient conservancy.

Remarks by Sanitary Commissioner.

Recommends that the municipal committee be invited to consider the measures of improvement suggested for the conservancy establishment with the view to their early adoption.

MUNICIPAL TOWN OF ALIPUR

In the Muzaffargarh District, inspected on the 14th January 1881.

Preliminary remarks.

The town is situated on a low-lying alluvial plain which is liable to inundations in the rainy season and is traversed by numerous canals. The town-site itself is slightly raised above the surrounding land, and is surrounded by a circular road. Most of the houses are of brick and from two to four storeys high; there are some mud huts amongst them, and reed huts about the outskirts of the town. The bazárs are mostly paved and roofed with a rough and untidy awning of mats.

Chief sanitary defects and suggestions.

Streets and drains.

About three-fourths of the streets and lanes are paved with brick, and drained. The drains and gutters all empty at different points on circumference of the town, some in the fields beyond the circular road, and some in the ditch of the circular road. They carry only well water and the slops of some houses, not sewage. On the east side of the town are several extensive depressions; one of these has been recently filled by ploughing high ground into it. This is a great improvement, as the pit contained foul stagnant water. The members of the municipal committee, Hotu Ram, Shola Misr, and Rai Parsetan Lal a landlord of the place, rendered assistance in this work with profit to themselves, their land being thus reduced to canal irrigation level.

System of sewerage, drainage, &c.

The surface drains empty at different points along the circumference of the town. The conservancy arrangements have recently been remodelled on the plan newly adopted at Muzaffargarh, and three manure stores have been established for collection and sale of the town-sweepings, &c.

Water-supply.

Wells, of which there are 15, *viz.*, 8 wheel and 7 pulley. Most of them are well protected by parapets, and several are roofed over. In some of the wheel wells the parapet is defective on the side where the bullocks work. The gap left here should be filled, as there is constant risk of contamination from litter thrown in by the feet of the oxen. The water is sweet and good, and rises in flood season to near brim.

Latrines.

There are only two public latrines, both for females. They are mere walled enclosures; one on the Khyrpur road, and the other on the Jatoi road, about 300 yards from the town.

Slaughter-yards.

There is no slaughter-house here. A few goats are slaughtered in the fields outside, the expenditure of meat being limited to one or two goats a day.

Cremation and burial grounds.

There is one grave-yard within municipal limits, now closed, and there are three still used at 400 or 500 paces outside the town on the east, north and west of the town. The cremation-ground is about ¾ of a mile from the town on its east side.

Remarks by Sanitary Commissioner.

Recommends that a plan be prepared for the proposed paving and draining of the town before any more work of this kind is put in hand. It is of the greatest importance that the levels of the drains be correctly laid. The roadways also should be properly planned instead of at present following all the existing bends and twists without cause.

MUNICIPAL TOWN OF SITAPUR,

In the Muzaffargarh District, inspected on the 15th January 1881.

Preliminary remarks.

The town is a straggling collection of brick and mud houses, many in a very dilapidated condition, entirely buried amidst palm and pípal trees. The surface is very uneven and interrupted by open spaces and clusters of trees. The main bazár is paved and roofed with an awning of mats. This last is in a very untidy and worn-out condition, and might with advantage be renewed on a uniform plan. The main portion of the town and public offices occupy a site slightly raised above the surrounding country, which is subject to inundation in the flood season from the Chenab, about a mile and a half to the east, and the Indus, 12 miles to the west.

Chief sanitary defects and suggestions.

Streets and drains.

Irregularity of surface and arrangement, the absence of properly laid-out streets and drains, and the extent of ruined tenements.

The town is not easily to be improved in point of systematic paving and draining. Much good is to be effected, however, by a carefully organized scavenging establishment. Sanitary Commissioner spoke at length to the members of the municipal committee and pointed out in detail the advisability and advantages of establishing manure stores at fixed sites round the town as receptacles of all its refuse and filth till such time as it could be sold. They promised to give the matter their attention, and Sanitary Commissioner hopes to hear that some practical plan has been adopted to rid the town of the numberless little collections of refuse now within its inhabited area.

System of sewerage, drainage, conservancy, &c.

No sewerage or drainage system exists. The conservancy arrangements are very defective, though the sale of town refuse by contract yields an income of Rs. 125 for the current year. Proprietors of fields, it appears, store their stable litter, &c., on the premises in town till convenient to remove it to their fields. The contractors for street refuse and sweepings also are allowed to remove the stuff and store it when and where they please. The municipal committee, on Sanitary Commissioner's advice, have promised to take this subject into consideration with the object of limiting the storage of private manure heaps to one week within the limits of the town, and of arranging for the daily removal of the contractor's stores outside the town. They are also to consider the advisability of establishing manure godowns at suitable sites as receptacles for all sorts of refuse matters, and their sale as manure by auction. Sanitary Commissioner will be glad to be informed of the arrangements finally determined by the municipal committee.

The conservancy establishment is employed only in the main bazárs and public streets, and, owing to the extent of the town and its scattered clusters of tenements, the scavenging is by no means as complete as is desirable. They leave a great deal of their work undone, and it seems impossible to remedy matters till the contractor's arrangement is first got rid of.

Remedial measures.

Improved conservancy as suggested. Perfection and extension of the present system of embankments. Trimming the trees immediately about the town.

Remarks by the Sanitary Commissioner.

Recommends that the Deputy Commissioner be asked to invite the attention of the municipal committee to the several points noted in this report, and that a copy of the resolutions of the municipal committee be furnished to the Sanitary Commissioner's office for information and record.

JATOI TOWN.

In the Muzaffargarh District, inspected on the 17th January 1881.

Preliminary remarks.

This little township consists of two divisions, separated by an intervening strip of cultivated land. The larger or main town lies to the south and is surrounded by a circular road and traversed by a bazár running north and south. This is the main street and is partly roofed with a very untidy mat awning, and partly paved and drained. The pavement was laid down only last year, and is the first instalment of a general work for the whole town as funds become available. There are some deep and extensive excavations beyond the circular road on the west and south and within it on the east. There are also some pottery kilns on the sides of this road. The site of the town lies low and is subject to inundation from the Indus in flood seasons. Some extensive embankments have been raised, as a protection against this, across the country to the west.

Chief sanitary defects and suggestions.

Streets and drains.

Only the main bazár is partly paved and drained. It is intended to complete this and pave the rest of the town as funds become available. No regular plan has been prepared for this purpose. It is of importance that no more drains be laid down till the levels of the several streets have been taken and a proper plan of a systematic drainage prepared in accordance therewith. The drains might all conduct to the outskirts through two or more main channels, the fewer the better, and they could be constantly flushed by connecting the well-slop and waste conduits with the street gutters. The large excavation between the thannah and town should be filled up, and the pool of stagnant water now in it would then be abolished. In the flood season this hollow becomes very foul and gives off very offensive exhalations. The ground around it is apparently high enough to bear considerable scraping, and by ploughing into the hollow the whole surface might be reduced to a uniform level. The mounds of the pottery kilns might be utilized for the same purpose and new kilns started at more suitable sites at a greater distance from the town.

System of sewerage, drainage, conservancy, &c.

There is no sewerage or drainage system. The conservancy arrangements are very defective. A staff of three sweepers is employed to remove street-sweepings to dung-heaps at the side of the circular road where the stuff accumulates in three or four great masses till it suits the contractor to move it away. The whole of the town-sweepings is sold to a contractor for the sum of Rs. 25 annually. There seems room for much improvement here. Sanitary Commissioner spoke to the municipal committee on this subject in detail, and they promised to start manure stores, and take steps to improve their conservancy arrangements. Sanitary Commissioner will be glad to hear what is finally decided by the municipal committee.

The staff is insufficient for the proper scavenging of the town, and is underpaid also. A proper arrangement for the collection and storage of town-sweepings, &c., as fuel and manure should produce an income sufficient to pay for a larger establishment than that now employed. There are several pottery kilns here, and their requirements alone must be something to count on besides the requirements for cultivation, which, here in the case of sugarcane, are considerable.

Remarks by the Sanitary Commissioner.

The proposed extension of paving and draining in the side-streets, as funds become available, should be done upon a regular plan comprising the whole town. The work should be suspended till such a plan has been first prepared and approved. A plan of surface gutters and street pavements in continuation of the commencement already made could be prepared without difficulty. The subject of manure godowns was fully discussed by Sanitary Commissioner and the municipal committee. The latter promised to adopt the recommendations of Sanitary Commissioner and in future to collect and sell town refuse for benefit of the municipal funds. I beg that the Deputy Commissioner may be asked to furnish this office with a report of the steps taken by the municipal committee in this matter, as also respecting some of the wells which required repair.

LEIAH TOWN,

In the Dera Ismail Khan District, inspected on the 30th January 1881.

Preliminary remarks.

The town was founded some 300 years ago on a wide sandy plain which has been, apparently, repeatedly flooded by the Indus, which flows about 5 miles to the west of the town. The site of the town lies low, though the ground rises gradually towards the centre of its area. There are no great hollows or excavations about the town. The Lala water-course lies about a mile to the west of the town and drains the country towards the south-west.

Chief sanitary defects and suggestions.

Streets and drains.

Only the central portion of the main bazár is paved and drained; all the rest of the town is unpaved and undrained. The completion of the bazár pavement has been provided for during current year by budget allotment of Rs. 2,000, and it is proposed to pave and drain other principal streets as funds become available. No plan has been prepared nor levels taken for this purpose. It is very important that no such work be carried out till a proper plan be first prepared for the whole town to be worked to completion gradually as funds become available.

System of drainage, sewerage and conservancy arrangements in force.

No sewerage and drainage provision, and the conservancy arrangements very defective. The municipality does not attempt to realize anything by the sale of town refuse. It appears to fall into the hands of a few persons who own fields about the town. The municipal sweepers, it appears, are paid privately by some of these to convey the stuff to their lands as manure. The market price of this manure is from 16 to 20 bullock-loads the rupee here. The town refuse from upwards of 1,000 houses, the bazárs, and streets, may fairly be reckoned—exclusive altogether of the stable litter of private houses, which is treated as private property—at 100 loads a day, representing a money value of Rs. 5 daily, which is lost to the municipality and gained by some who have no right to it. Were the municipality to collect this stuff and sell it as manure, they would not only greatly improve the conservancy of the town but add a handsome sum to their municipal income.

The sweeper establishment requires to be more carefully looked after and efficiently worked. From what Sanitary Commissioner gathered from the remarks of different persons and some members of the municipal committee, the sweepers are more engaged in manuring the fields of land-owners about the town than in attending to the thorough conservancy of its streets.

The introduction of manure godowns would enable them to discharge the duty of town scavenging more efficiently than is at present the case.

Water-supply.

From 20 wells, all worked by wheels. Nine are provided with parapets and cisterns of red brick masonry, and four of the rest are to be similarly protected this year. The wood-work about 3 of the wells Sanitary Commissioner saw is very old and rotten, but the wells being constantly in work the water is not sensibly affected. The water is considered good. The wells are periodically cleaned out, but they all require careful attention to provide against pollution from rotten machinery as much as surface impurities.

Latrines.

There are 4 latrines, 1 for males and 3 for females. All are mud-wall enclosures, that for males being divided into compartments. The municipal committee have applied for the construction of 4 more. The ordure from the latrines is appropriated as manure by the owners of the land on which the latrines are built. It is here valued as manure, and hence the desire to see the number of latrines increased.

Remarks by the Sanitary Commissioner.

Recommends that the Deputy Commissioner be asked to consult with the municipal committee on the best means of securing a more efficient scavenging of the town, and the establishment of manure godowns for the collection of all town refuse with the view to its sale as manure or kiln fuel for the benefit of municipal funds. The realization of money by the sale of this stuff will be an incentive to its more extensive collection and the consequent more thorough scavenging of the town.

Recommends also that a proper plan of paving and draining on a comprehensive and uniform system for the whole town be prepared before executing any more works of this kind, the scheme once approved to be carried out in bits year by year as funds become available.

Many of the wells require pucca conduits for waste water. These should be provided in preference to other works.

KAROR TOWN,

In the Dera Ismail Khan District, inspected on the 31*st January* 1881.

Preliminary remarks.

The town dates from about 300 years ago, and is built on a sandy plain under the shadow of the shrine of Lal Isan "Karor." To the west of the town the land drops by a steep bank on to a low-lying tract which is subject to inundation from the Indus, and is drained by the Nulláh Lala which flows by Leiah. There is a fair held here annually for eight days, in the latter half of August, in honor of the local saint, whose shrine is then visited by about 25,000 persons. There is a good straight street of shops attached to the shrine. They are only occupied at the time of the fair.

Chief sanitary defects and suggestions.

Streets and drains.

The main bazárs are nicely paved and drained, and four of the side-streets are furnished with open surface drains of brick masonry with paved bits under the water spouts of private houses, the rest of the roadway being left unpaved. Sanitary Commissioner understands that it is intended to pave and drain the whole town in bits as funds become available, and that about Rs. 2,000 have been allotted in this year's budget for this purpose. The work is done on no plan, and consequently the several streets drain independently of each other towards the periphery of the town. A proper plan should be prepared with the levels so adjusted as to reduce the number of outfalls to a minimum, and no more work of this kind should be put in hand till a plan on a comprehensive and uniform scale for the whole town is first prepared.

System of sewerage, drainage and conservancy arrangements in force.

There is no system in the work already done. The several street drains are not levelled but follow the natural inclination of the surface, and have their outfalls in different parts of the circumference of the town. The conservancy arrangements are very defective, and there are numerous heaps of dung and rubbish stored as manure in the courts of private houses all over the town. Sanitary Commissioner found the main streets well swept and the town generally in a fairly well scavenged condition. The municipal committee give all the town-sweepings to the municipal sweepers at the nominal sum of Rs. 3½ a month. The market value of this stuff here is 40 donkey-loads the rupee. The daily out-turn from 700 houses and the main bazárs and streets is about 50 or 60 donkey-loads a day, exclusive of the latrine ordure which is not cared for at all by the municipality, but appropriated by private individuals. If the municipal committee took the collection and sale of this stuff into their own hands by the establishment of manure godowns, they could realize Rs. 400 at least a year by its sale, and at the same time greatly improve the conservancy of the town.

The present establishment, which consists of 8 sweepers at Rs. 4 a month, is insufficient for the work of the town. Sanitary Commissioner recommends 1 Jamadár at Rs. 6 and 12 sweepers at Rs. 4 each, and the establishment of four manure godowns at convenient distances from the town, for the storage of all manner of filth and refuse matter removed from the streets, latrines, bazárs, &c., &c.—in fact for all manure material other than the stable litter of private individuals who convey it away periodically (once or twice a week) to their fields.

Water-supply.

From 9 wells all worked by wheels, and 2 wells worked by rope and bucket. The water is sweet and reckoned good. In most of the wells the wood-work is in a very decayed state, and the surroundings of the wells very foul and neglected. They require to be furnished with masonry parapets and waste-water conduits.

Latrines.

There are 8 latrines, 4 for males and 4 for females. They are mere mud-wall enclosures, those for males being divided into compartments. The number is quite sufficient for the ordinary requirements of the town. Sanitary Commissioner understands that the municipal committee contemplate building 8 more. He does not see the necessity of this, unless it is to furnish manure supplies to private individuals. At present the ordure of the public latrines is not utilized in any way by the municipality, but is appropriated by the owners of the fields in their vicinity by private arrangement with the sweepers. All this ordure, as well as that of the temporary latrines established at the time of the annual fair held here, should be added to the stock of the manure godowns and sold for the benefit of the municipal funds. The stuff should be treated as a marketable commodity (it is a valuable one here), and as the property of the municipality. It may be sold as manure or as fuel for the pottery kilns, of which there are five or six around the town.

Cremation and burial grounds.

There is one very extensive burial-ground adjoining the shrine to the east of the town. It is kept in good order. There is an extensive excavation between it and the compound of the dâk bungalow, from which earth for building purposes is taken.

There is one burning-ground about half a mile to the east of the town on the bank of a nulláh, and far away from human habitations.

Remarks by the Sanitary Commissioner.

This town is capable of being made a model little municipality, by care in the prosecution of the paving and draining already commenced, and by forethought and economy in the conservancy arrangements. I would recommend that the Deputy Commissioner be asked to have a proper plan prepared for the proposed paving and draining of the town on a comprehensive and uniform plan. Also that he consult with the municipal committee on the measures to be adopted for putting the conservancy arrangements on a more efficient and self-supporting system as indicated in this report.

I should like to be informed in due course of the action taken by the municipal committee on these points.

BHAKKAR TOWN,

In the Dera Ismail Khan District, inspected on the 2nd February 1881.

Preliminary remarks.

The town is situated on the bank of a deep watercourse which in the flood season carries a considerable stream which joins the Lala at or near Karor, and is navigable up to Bhakkar. The land to the west is low, cultivated, wooded, and subject to inundation from the river. To the east the land is high and dry, a sandy wilderness.

Chief sanitary defects and suggestions.

Streets and drains.

None of the streets are paved or drained, but it is in contemplation to pave and drain the main bazár. The town rises considerably towards the centre and is favorable to surface drainage. Nothing of the kind, however, should be begun till a plan has been prepared comprising the whole town. There are several pottery kilns inside the town. They have been closed, and Sanitary Commissioner understands that arrangements are in course of completion for their entire removal with the aid of municipal funds. It will be a great improvement when this is effected. Sanitary Commissioner found the town in a fairly swept condition, but there is great room for improvement in its general conservancy.

System of sewerage, drainage, and conservancy arrangements in force.

There is no system of sewerage or drainage. The conservancy arrangements are very defective, and the state of the town far from satisfactory, owing to the collections of filth and rubbish in private quarters. The town is divided into 8 mohallas, and a sweeper is allotted to the charge of each. Each sweeper therefore has about 200 houses besides bazárs and streets to attend to. Practically he does nothing but sweep the bazárs. The sweepings of private houses and side-streets is left to the cultivators, who ply for this stuff as manure for their fields. Last year the municipality sold their town-sweepings by contract for Rs. 10, this year for Rs. 20. If the municipality took up this work themselves and stored the stuff in manure godowns, they ought to get easily Rs. 350 or Rs. 400 a year by the sale of the manure collected from town-sweepings, latrines, slaughter-house, &c. Sanitary Commissioner explained this to the members of the municipal committee, and they promised to give the subject their attention. There are private interests in the way of the municipal committee acting freely in the matter, but these should not be allowed to interfere with the welfare of the community at large.

Latrines.

There are 2 for females only, mere walled enclosures. The ordure is added to the contents of the manure godowns, Sanitary Commissioner was told, but, from the appearance of the latrine he inspected, it was very little used, though furnished with a long row of seats and utensils in pairs, as in latrines for males. The utensils were new and had evidently never been used.

Remarks by the Sanitary Commissioner.

Recommends that the Deputy Commissioner be asked to consult with the municipal committee on the best means of putting the conservancy establishment on a more efficient and self-supporting footing, as indicated in the body of the report, and to furnish this office with a copy of the resolutions adopted by the municipal committee on this subject and the others noted in the report.

DERA ISMAIL KHAN,

Inspected on the 4th and 5th February 1881.

Preliminary remarks.

The town is situated on an open flat plain about 4 miles from the west bank of the Indus, and has the civil station, military cantonment and fort on the east and north sides. It is a town of modern date, and has been greatly improved during recent years under British rule. It is crossed at right-angles by two main bazárs, and is surrounded by a circular carriage road which is planted with trees and watered from a canal brought from the Luni river.

Chief sanitary defects and suggestions.

Streets and drains.

The main bazárs and some of the side-streets are paved and drained, but most parts of the town are not so. Sanitary Commissioner understands that a plan of the town with the levels of the streets has been prepared with the view to the extension of the paving and draining to all parts as funds become available, but it does not appear that any comprehensive and co-ordinate system of paving and drainage has been prepared. It is very important that such a plan should be prepared and sanctioned before this work is carried out in other parts of the town. The streets are generally wide and airy, and there are several open spaces in the interior of the town, but the general surface is very much of a flat, and unless the drains are carefully adjusted as to levels there is sure to be a blockage.

System of sewerage, drainage and conservancy arrangements in force.

The drains already laid down discharge at different spots around the circumference of the town, and are mainly for storm-waters, the ordinary sewage from private houses being absorbed by the soil for want of connecting channels.

The conservancy arrangements are capable of much improvement by a more efficient working of the existing sweeper establishment, whose supervision is not as complete as it might be. Sanitary Commissioner found considerable quantities of litter left on the surface in various parts of the town, the collection of which would add some hundreds of bullock-loads of material to the manure godown, and to that extent improve the cleanliness of the town. The litter of side-streets, ordure of waste corners and spaces, the cattle-dung of the grain mandi and Povindiah Serai, and such like places, if carefully collected, would add some hundreds of rupees worth of material to the general stock in the manure godowns already established, and at the same time vastly improve the cleanliness of those parts of the town.

The conservancy establishment appear sufficient for the requirements of the town, but the men require more careful supervision and systematic working. The four jamadárs are told off to the four mohallas of the town. They should each have their own gang of sweepers, and be held responsible for the thorough scavenging of their respective quarters. Their aim should be to collect as much as possible of every kind of refuse and decomposable matter for conveyance to the manure godowns, and to search the stuff out from the streets and waste corners, &c., as a material convertible into money for the benefit of the municipal funds.

Water-supply.

From 197 wells. Several of them require parapets, cisterns, and waste-water conduits, particularly the much-frequented Gulsher well in Topkhana bazár. The wells already provided with cisterns, parapets and conduits were generally in a very foul and sloppy condition from neglect and bad repair. Their cleansing after repair should be more carefully looked to by the Darogah of conservancy. At present many of these wells are in a very disgraceful state of filth.

Latrines.

There are four latrines—three inside and one outside the town—which are all open and kutcha built. Two have separate compartments for men and women. The latrines inspected by the Sanitary Commissioner were in good order. The new one built on the Amritsar plan requires a roof (as now added at Amritsar) to render it perfect. Glazed utensils are being introduced into all the latrines as they are procurable. This is a decided improvement. Sanitary Commissioner found the ground behind the new latrine in a very foul state and covered with ordure, as if it were resorted to instead of the latrine itself. There was a pit here also from which dry earth was dug for the service of the latrine. This is very faulty. The carts which convey the latrine filth to the manure godowns should bring back stores of dry earth from outside the town.

Slaughter-yards.

There are two slaughter-houses—one inside and one outside the town—which are open. A new one on the same plan as that of Amritsar is under construction outside the town. As soon as the new one is completed, the floor of the old one should be dug up and the soil added to the contents of the manure godown. The abandoned site should then be levelled and ploughed up with the ground of the adjoining open space, which at present is in a very unwholesome state. The offal, blood, &c., of the slaughter-house should be regularly added to the stock in the manure godowns.

Remedial measures.

The points requiring particular care are the protection of the wells from ordinary causes of pollution and the more thorough and efficient scavenging of the streets and bye-ways.

Miscellaneous.

With careful and economical scavenging, the income derived from the sale of the town sweepings and refuse might easily be doubled in the first ploughing season, and still further increased as the work advanced in completeness.

Remarks by Sanitary Commissioner.

A great deal has been done during the past few years by the Deputy Commissioner, Major Macaulay, to improve the general sanitary condition of this town. Much remains to be done in the matter of minor details which are not without a special importance of their own, for on a due attention to them depends the utility of the greater works already carried out. I would recommend that the conservancy establishment be more carefully supervised and systematically worked with the object of effecting a more thorough scavenging of the parts of the town off the main thoroughfares, and that the care of the wells be made a more important duty either of the bhisti establishment or sweeper staff as the municipal committee may consider advisable.

DERA GHAZI KHAN,

Inspected on the 20th and 21st December 1880.

Preliminary remarks.

The town is situated on a low-lying flat plain about 1½ mile from the west bank of the Indus, against the overflow of which it is protected by a series of dams raised across the intervening tract, and is surrounded up to its houses by cultivated fields. Its circumference is about 3 miles, and is marked by a circular road. The town stands on a slightly more elevated site than the adjoining civil station, and its central portion is somewhat higher than the quarters towards its outskirts. The most part of the town is built of baked bricks, and there are several spacious courts and some cultivated fields within its area. It has no walls enclosing it, but there are some gateways at the entrance to its main bazárs.

Chief sanitary defects and suggestions.

Streets and drains.

The main bazárs and streets, about two-thirds of the town, are paved and drained with surface-gutters at the sides. The main bazárs are also covered with a very untidy and irregular roofing of loose matting supported on undressed beams and rafters. Many of the lesser streets, though not paved, are furnished with surface-gutters of masonry. The municipality is gradually paving the lesser streets as funds become available, but upon no uniform or comprehensive system. The drains of the town run into the nearest main channels, and discharge through them at several different outfalls all round the circumference. Some of these pass across the circular road to the fields beyond, but most empty into depressions of the surface between the road and town, and some empty on to open spaces within the town area. Before laying down any more pavements and drains, it is advisable that the municipality should have the town surveyed and levelled with the view to the whole sewerage system of the town being remodelled so as to discharge by two or three main outfalls instead of the many now existing. At present the sewage of the town is discharged into hollows immediately around its outskirts, or into the fields beyond, or is absorbed by the soil within the town area.

System of sewerage, &c.

There is no systematic sewerage, the drains forming a number of different groups and channels emptying independently at many different spots just outside the town. There are about 20 of these outfalls.

The conservancy arrangements are extremely defective, and there are numerous dung-heaps and other collections of rubbish and filth in all parts of the town. The arrangement in force here does not allow of a satisfactory scavenging of the town being possible. It is the custom for the several houses to throw out their sweepings and rubbish, &c., on to appointed sites in the public streets, whence cultivators are allowed to carry it away to their fields as manure. The cultivators pay Rs. 1-14 a year for the privilege of taking away a bullock-load daily, but they are under no restrictions and no supervision. They come or not when it suits their convenience, and take as much as they please without a thought of cleaning the sites whence they remove the filth. The faults of this arrangement have long been felt and acknowledged, but it appears that personal interest obstructs improvement.

The entire conservancy of the town requires to be remodelled. The sweepings, litter, &c., should be taken possession of by the municipality and stored in godowns at suitable sites around the town for systematic sale as manure or fuel. The income so derived would go far to pay the cost of the conservancy establishment. At present the yearly amount realized is only Rs. 250.

The conservancy establishment might, with advantage, be re-organized and rendered more efficient. The number of sweeperesses might be reduced to six—one for each latrine, and that of the sweepers be increased by six, and the addition of others for a systematic and comprehensive scavenging with manure godowns as the sites for collection.

Water-supply.

From wells, of which there are 230 inside the city. Most of them are protected by parapets and platforms, and some are provided with watering-troughs and waste-water conduits. A considerable number are worked yb wheels. Sanitary Commissioner noticed that several of the wells gave out a distinct odour of bilge water, though these, he is informed, are not used for drinking purposes. The wells are supposed to be thoroughly cleaned out annually. The rope and wood work of those worked by wheels require careful attention and renewal when decayed. The water, though hard, is considered wholesome.

Latrines.

There are twelve public latrines—six for men and six for women—in different parts of the city. They are mud built and divided into compartments with two or three seats in each, but they are neither roofed nor furnished with utensils. The ordure is collected in shallow pits close by till removal to the fields. When the municipality have re-organized their conservancy arrangements, and established manure godowns, the filth of the latrines should be mixed up with the mass of litter, &c., of the godowns.

There are about fifteen pottery kilns in seven different spots within the city. They are supplied with fuel mostly from the Cavalry Lines in cantonments, and do not, Sanitary Commissioner is told, use the sweepings, &c., of the city, this being appropriated to the use of the cultivators. These kilns should be removed to sites outside the city, if possible.

Remarks by Sanitary Commissioner.

In my address to the three members of the municipal committee who accompanied me on my round of inspection, I pointed out the main features of the faulty conservancy of the city, described in detail the success achieved by the Amritsar municipal committee, and explained the advantages to be derived from an efficiently worked and properly organized scavenging staff. The members allowed the force of my arguments, and expressed and hoped that this city would also soon have a more satisfactory system of conservancy. It was apparent however, from their remarks, that there was some difficulty in making a change, owing to personal interest in the present system by which many of the city people and the members of the municipal committee derived a direct advantage, getting their lands manured from the town sweepings and refuse at a merely nominal cost.

Unless the municipal committee is prepared to put aside the personal interest in this matter in favor of the public good, I fear little in the way of improvement can be expected. I would suggest that the earnest attention of the municipal committee be invited to this important subject with the view to its consideration being dealt with in the interest of the community at large.

Summary of Inspection Reports received from Civil Surgeons up to end of March 1881.

KARNAL DISTRICT.

Inspection report of Karnál, inspected by Assistant Surgeon Radha Kishen in November 1880.

Preliminary remarks.

Karnál is the head-quarters of the district. It is situated on a slightly raised ground about 710 feet above the sea-level. The Western Jumna Canal runs quite close by on its east.

Chief sanitary defects, and suggestions for improvement of same.—(a) Streets and drains.

The neighbourhood of the canal and the swamps of stagnant water on the south of this town make the place very unhealthy throughout the year. Arrangements for metalling the principal streets and constructing the pucca side-drains have been made and the work commenced. This work, when completed, will be a great improvement in the sanitation of the town.

The small lanes at present are in just the same dirty condition as found by the Sanitary Commissioner during his last visit.

There are still thousands of cattle stalled in Karnál at night, and most of them are under the same roofs as their owners.

The urine of the cattle, together with a great part of the water used for cleanliness in the houses, runs into the sewers continually running out of the town; but a large quantity of it is absorbed in the soil and makes the houses damp and moist, and very unpleasant and unhealthy for those who live in them. The richer classes, both Hindus and Muhammadans, live in the upper storeys, but the poorer and middle classes are obliged to use the lower parts of their houses and constantly suffer from fever and its *sequelæ*.

There are a large number of "gobar" godowns inside the city, especially in "Ghosian Gate" and "Jaton Gate" lanes.

(b) System of sewerage, drainage and conservancy arrangements in force.

The system of sewerage and drainage at present is unsatisfactory. The gutters in the kuchas, which in almost all instances are paved with bricks laid on edge, are in the centre and are generally dirty.

The small drains of the *kuchas* pour into the big sewers in the bazárs, and these ultimately end in Gandá Nulláh ditch, the main channel of escape for sewage. The solid filth and other rubbish are carried out of the town by the sweepers, and collected partly in heaps on the east, very near the walls of the city in a shallow tank, and partly in a spot to the west of the Sadar Bazár. These heaps are not covered by dry earth, and give out an offensive smell to the passers-by. After about twelve months or so, the heaps are opened and sold by the sweepers to the zamindárs as manure: and the sweepers realize more than Rs. 500 by these sales every year.

A spot at a good distance from the town should be selected to collect the filth, and proper trenches dug to bury the same.

A large quantity of manure is yearly brought from the villages also to be spread in the fields near this town.

There are no conservancy carts in use.

(c) Water-supply.

The wells in the town are cleaned every year, some by the municipality and some by the people themselves. The water of most of the wells is good and wholesome. There is one large pucca tank near the Municipal Hall, but its water is only used for the purpose of cleanliness, and never for drinking.

There are about 423 wells inside and outside of the town. The depth of the wells from the top to water-level is about 24 feet. It varies in different times of the year exactly in accordance with the rise and fall of the canal, and the swamp on the south of the city. Both these water sources seem to have connection with the wells at the bottom.

(e) Latrines.

Three new pucca latrines with vaulted roofs have been completed. Iron pans coated with coal-tar have been provided for them.

The old latrines, which are six in number, are still in use. They have not been properly repaired, as they are to be soon replaced by new ones, and are very dirty. Special sweepers are appointed to look after their cleanliness, and earthen pans with dry earth placed in them. The outside ground is still frequented by the people for relieving themselves in preference to the latrines.

(f) Slaughter-houses.

A new slaughter-house has been built and stone slabs fitted on the floor. The place is not enough for the requirements of the people, and so it is to be increased by half as much again.

The filth is removed from the inside of the yard to the manure heaps, which are quite close to it. The people are generally clean and tidy.

Remedial measures to be adopted, and other suggestions.

The house latrines should be carefully inspected, and, if possible, the cattle should not be allowed to be stalled in the houses; the drains of the small lanes washed daily, and the filth removed from the city and carefully buried in trenches or pits and covered over by dry earth; and the Gandá Nulláh should be carefully cleaned.

Remarks by Sanitary Commissioner.

Recommends that the attention of the municipal committee be invited to Civil Surgeon's inspection report regarding sanitary condition of Karnál with the view to their adopting measures to remedy the defects pointed out. It appears to undersigned that if the municipal committee put their conservancy establishment on a proper footing and introduced manure stores for the entire refuse of the town, they could, by its sale as manure, realize a much larger sum than Rs. 500, stated to be realized by the sweepers, whilst at the same time the conservancy of the town would be more efficiently performed. In the manure godowns or enclosures should be collected every kind of filth and decomposable matter, namely, street sweepings, house refuse and kitchen garbage, latrine ordure, slaughter-house offal and blood, and dead cattle, carcases of domestic animals, &c., &c. They should in fact be receptacles for the entire filth of the place. This filth should, when crumbled into manure, be sold to the credit of the municipal fund.

PANIPAT TOWN (DISTRICT KARNAL),

Inspected on 28th November 1880.

Preliminary remarks.

This town is situated on the south of Karnál and is a Tahsíl station. It is remarkable for its manufactory of glass and brass vessels.

It is about 20 miles from Karnál on the Grand Trunk road.

Chief sanitary defects, and suggestions for improvement of same.

(a) Streets and drains.

The principal streets are being metalled, and nice pucca drains on sides being constructed.

Decidedly it will be a great improvement in the sanitary condition of so important a town.

The small lanes remain just the same as before, but were in fair condition as regards cleanliness.

A pucca drain has already been completed on the south of the town, and in this most of the small drains of the streets of the southern part of the town meet.

The gutters of the small streets should be daily washed.

(b) System of sewerage, drainage and conservancy arrangements in force.

On my visit, most of the private latrines were furnished with earthen pans, and in some dry earth was also used.

Some Crawley carts have been ordered from Delhi but have not yet been received.

The streets are daily swept, and the filth and rubbish carried out of the town by sweepers and collected partly near the slaughter-house and partly on the west of the town beyond the Grand Trunk road. There are two more spots for such filth, one in the south and the other in the east. The heaps were not covered with dry earth in any of the above places.

I suggest that the filth should be buried in prescribed trenches or pits, and covered properly with dry earth.

(c) Water-supply.

Most of the wells in the town have brackish water and are protected by parapets.

The water of some wells outside the town is pretty sweet and wholesome.

There are a large number of wells in and outside of the town. Their depth is about 24 feet from top to the surface of water.

(e) Latrines.

Two pucca latrines have been constructed for both sexes and are to be provided with iron pans, protected with coal-tar and iron cisterns similarly coated for the reception of urine.

The old latrines were pretty clean and contained dry earth.

Slaughter-houses.

Material has been collected for the construction of a new slaughter-house.

The old slaughter-yard was in a fair condition. Its floor is swept daily, and after the cattle have been slaughtered its drains and cisterns are washed as far as can be.

Remedial measures to be adopted, and other suggestions.

The wells should be cleaned, and the sewage and filth properly deposited in the trenches and covered with dry earth.

Remarks by the Sanitary Commissioner.

The Civil Surgeon does not state what becomes of the town-sweepings. I would recommend that the municipal committee introduce the system of manure stores for the collection of all manure, filth and refuse matters, and their sale for the benefit of the municipal funds, as proposed for Karnál.

VILLAGE ASAND (KARNAL DISTRICT),

Inspected on 20th December 1880.

Chief sanitary defects and suggestions.

The houses, and their yards which are inhabited by people, are used for cattle also, and are consequently very filthy.

Heaps of manure before the houses, streets, &c., were not swept. Some sweepers should be employed at Rs. 2 each and their wages be met from the funds from which chowkidárs are paid.

There are large *"gobar"* godowns in and outside of the village.

I suggest that the heaps of filth before the houses should be removed to some distance and the people prevented from easing themselves near the tanks.

Remarks by Sanitary Commissioner.

Recommends that the Deputy Commissioner be asked to draw the attention of the lambardárs of this village to the necessity of their arranging for the collection of its refuse matters in godowns at fixed sites enclosed by low mud walls at convenient distances from the village. Also to the sanitary defects pointed out by the Civil Surgeon, with the view to the adoption of remedial measures.

BHIWANI TOWN (DISTRICT HISSAR),

Inspected on 1st *February* 1881.

Preliminary remarks.

The city of Bhiwáni is situated at a lower level than the surrounding country, therefore the rain-water flows from the exterior into the city tanks, locally called johurs, and the dirt and filth of the town naturally collects into these tanks, in various parts of the town, *viz.*, Noonsar tank, Bhojaiwalla's tank, and Pat Ram's tank.

Chief sanitary defects, and suggestions for improvement of same.

(a). Streets and drains.

The main streets are kept in good order. The side or back streets require improvement with saucer drains. This is very essential, also proper urinals in the bye-lanes for the passers-by, who pollute the street with urine.

System of sewerage, drainage and conservancy arrangements in force.

The sewerage and drainage are very defective. Each empties itself into the three *large tanks* of the town, which I consider very detrimental to the health of such a large population.

The dry-earth conservancy arrangements are in force and the establishment sufficient.

Water-supply.

Both from the wells and johurs (tanks) the former (most of them) are situated on the banks of johurs and contain sweet drinkable water. The depth of these wells varies from 60 to 80 feet from the surface.

The lower or poorer classes use the contaminated tank water, as long as it is procurable, and, when dry, the well water is supplied to them at the expense of the municipality.

Latrines.

There are 27 latrines, *viz.*, 15 for females and 12 for males.

The former are within the city-walls and the latter outside. The excreta from all are put into trenches outside of the town with plenty of dry earth.

The latrines are kept clean and were without smell.

Slaughter-houses.

Only one slaughter-house outside of the town for killing goats and sheep.

No cows are allowed to be slaughtered on account of the Hindu population.

Remedial measures to be adopted, and other suggestions.

Government should order the sewerage and drainage to be improved at once, as the municipal funds are very rich and could afford the improvement.

Miscellaneous.

The brick-kilns, potteries, dyeing tanneries and saltpetre manufactory should be removed from the city.

The sewerage and drainage should be improved so as to prevent the drinking tank from being contaminated.

Remarks by Sanitary Commissioner.

Recommends that the municipal committee be invited to consider the pressing evils of the present defective condition of the city drainage with the view to having a survey made, and plans and estimates prepared for a drainage project to provide for the conservancy of the town-sewage outside the intramural area.

Recommends also that the town-sweepings, &c., be systematically collected in manure godowns at convenient sites outside the walls and there be sold for the benefit of the municipal funds.

VILLAGE SITHU GANNOO (SIRSA DISTRICT),

Inspected on 10*th March* 1881.

Chief sanitary defects and suggestions.

A very large number of cattle is lodged in almost every house, &c.; the filth is not regularly cleaned, in consequence of which the yards look very dirty.

Remarks by Sanitary Commissioner.

Recommends that the lambardárs of the village be summoned by the Deputy Commissioner for the purpose of devising measures in consultation with the Civil Surgeon for the regular and systematic removal of village filth, cattle litter, &c., to manure stores (*khád gudám*) or low mud-wall enclosures to be constructed at convenient sites outside the village. These enclosures, and these only, should be the receptacles of all manure, of village refuse and filth, the deposit of which at other spots should be prohibited.

The tanks should be protected against pollution by cattle.

VILLAGE RORI (SIRSA DISTRICT),

Inspected on 28th March 1881.

Chief sanitary defects, and suggestions for improvement of same.

Drainage good, it runs into four ponds situated outside the town. The water of these ponds is not used for drinking purposes.

Almost all the streets and bazárs were clean; but the yards of some of the houses were damp and dirty, owing to the presence of cow-dung and urine of a large number of cattle that are lodged there. Dry earth should be liberally used to keep these yards clean and dry.

Remarks by Sanitary Commissioner.

The attention of the municipal committee should be called to the unsatisfactory manner in which the birth and death registers are kept. It would be advisable that the members arrange to inspect the registers once a week in rotation, affixing their signatures with remarks in the margin.

The conservancy arrangements are evidently much neglected. The municipal committee might be asked to organize the conservancy establishment with the view to collecting all town refuse in manure stores (mud-wall enclosures) to be established at suitable spots in the town outskirts, and for its sale for the benefit of the municipal funds.

Also to arrange for the protection of the drinking-water tanks against pollution—bathing and washing clothes in them should be strictly prohibited, and delinquents be severely punished.

SADHAWRA (UMBALLA DISTRICT),

Inspected on the 7th and 8th February 1881.

Chief sanitary defects, and suggestions for improvement of same.

At first sight the town looks clean and open, but on closer inspection the neighbourhood of wells and the *chahbachas* of dwellings are found to be reeking with putrid filth, and cattle and dogs noticed to be drinking the superincumbent fluid of the filth at the wells neighbourhood. The main bazár runs east to west, is narrow, but 14′ 10″ wide and is said to be more than a mile long. It is so narrow that the encroachment on it I saw should not be permitted—in the way of shops jutting out. The pavement of it was in good order, of bricks on edge, the drains running down its centre and the pavement sloping on each side to it. The private privy arrangement I saw allowed of any amount of soakage, urine, &c., trickling under wall of little compound into street. In the case of the wealthier it oozes into the *chahbachas* below and is permitted to ferment into thick black compost bubbling with gaseous action.

THANESAR TOWN (UMBALLA DISTRICT),

Inspected on 14th February 1881.

A defect I noted was house-sewage oozing down the sides into cesses below—which was very frequently caked on sides of houses. A better working of conservancy necessary. The main street is about 20′ broad—is fairly paved with bricks on edge and side-drains, and was clean at time of my visit. No good drainage to side-streets, which latter were dirty here and there with collections of sewage; it was said that it was from private houses and that the committee had no power over it.

Remarks by Sanitary Commissioner.

The sanitary interests of this town are evidently entirely neglected by the municipal committee. The arrangements are very defective and the whole establishment requires to be remodelled. A properly qualified conservancy superintendent should be appointed and held responsible for the more efficient working of scavenger staff. Manure stores (mud-wall enclosures) should be established at convenient sites round the town for the reception of the street sweepings and town filth of all sorts. This stuff should be sold as manure for the benefit of the municipal funds.

Recommends that the Deputy Commissioner be asked to convene a special meeting of the municipal committee, with the view to adopt measures to remedy the defects pointed out by the Civil Surgeon and the general improvement of town conservancy.

UMBALLA,

Inspected on 22nd, 23rd, 24th and 25th February 1881.

Chief sanitary defects, and suggestions for improvement of same.

The *chahbachas* (cesses) in Kullál, Kuthree, and Chowk Mujhla mohullas are most filthy, and so are the centre drains of their street. On the Grand Trunk road side of the town I found nothing objectionable in the streets; I saw little there in the way of drains. This part of the town may be said to be hutted for the most part and where the poorer inhabitants live. The streets of the better part of the town are narrow, with high masonry houses on each side, and seemed to me to require opening out to make open spaces. This better part of the town comprises the Kullál, Kuthree and Chowk Mujhla, &c., mohullas.

Remarks by Sanitary Commissioner.

The Commissioner and Superintendent, Umballa Division, in forwarding this report to undersigned, states "that the Deputy Commissioner's earnest attention has been called to the defects pointed out by Dr. Bateson." It is evident that the sanitary condition of this city is in a very unsatisfactory and discreditable state. This conservancy establishment requires to be thoroughly remodelled and the scavenging of the city provided for on a regular system. Manure godowns should be established and the city refuse be regularly collected by the municipality and sold for the benefit of its funds.

It is hopeless to expect the people to frequent the public latrines unless they are maintained in a decent state.

The Civil Surgeon's suggestion regarding the water-supply is well worthy of consideration by the municipal committee.

The state of the bye-street gutters and cess pits or sinks is very discreditable to the management of the municipal committee, and it is hopeless to look for improvement unless the members give their attention to the subject.

NAKODAR TOWN (JULLUNDUR DISTRICT),

Inspected on 16*th September* 1880 *by* Surgeon-Major J. R. DEANE, *since transferred to Gujrat District.*

Chief sanitary defects, and suggestions for improvement of same.

Most of the streets and lanes are paved, some of which are broken up and are receiving repair. The centre street is raised in the centre with side-drains, while some of the narrow ones are cleaned down the middle.

Remarks by Sanitary Commissioner.

(a)—The repairs to old streets and lanes should be on the improved system of side-gutters and raised roadway, and not on the old plan of a gutter down the middle line of the roadway.

(b)—The habit of throwing contents of cesspools over the streets should be stopped. The foul water should be conveyed outside the town and thrown on the fields.

(c)—The seven platforms and reservoirs of wells, which are out of repair, should receive immediate attention, from motives of economy apart from sanitary considerations.

(d)—The town-sweepings should be stored in low walled enclosures outside town and sold for benefit of municipal funds.

(e)—The wells near the burial-grounds can hardly escape contamination. They ought to be closed at once. The burial-grounds near the Charasi Darwaza should be closed, and a new site selected at a suitable distance from the town.

FATAHGARH TOWN (GURDASPUR DISTRICT),

Inspected on 23*rd December* 1880.

Chief sanitary defects, and suggestions for improvement of same.

Only one street is paved, that is, the portion of the Dera Nanak and Amritsar road, which passing through the town forms its principal street; no shop-counters are built over the side-drains. All the other streets are more or less in a state of filth. There are no drains whatever. There is a favorite well under a large nim tree; the water (spill) from this soaks in large quantities near the well, and the surplus water from this puddle follows several narrow unpaved lanes for a long distance, receiving in its course the drainage of compounds and private latrines; the smell from this, even in the cold weather, is very noxious. Round the fort there is a large ditch undrained. This fort is in the centre of the town, the ditch receives all the surrounding surface drainage, and after rain it fills up with water, which, stagnating, gives rise to the most filthy smell. The members of municipal committee all agree that this is a most filthy part of the town, and in this neighbourhood sickness is always present and very severe in character. Close by there is a manufactory for leathern bottles for holding oil and ghee. This also is much complained of by the members.

Remarks by Sanitary Commissioner.

Recommends that the early and earnest attention of the municipal committee be called to the very serious defects noted by the Civil Surgeon.

The establishment of public latrines and of godown enclosures for town filth is a most important want. When these are provided and the conservancy staff is properly organized, there should be no difficulty in very greatly improving the present insanitary condition of this town. The contents of the filth godowns (low mud-wall enclosures at suitable sites—three or four may be necessary) outside the town should be sold as fuel for kilns or as manure for fields, and the proceeds credited to the municipal funds. The godowns should be the receptacles for all the refuse matters of the town, latrine ordure, slaughter-house offal, &c., &c.

The holes, or "*chappars,*" mentioned in the report should be filled in with earth and levelled with the general surface, and the town-drainage be disposed of by means of an outfall circular sewer, emptying into cultivation at a distance from the town. The supplying of the tank from the water of these "chappars" should be prohibited. It should be fed from the canal direct.

The fort ditch should be filled in and levelled, if possible, and the drainage now flowing into it be led out of the town.

The manufactory of leather jars should be removed to a site outside the town.

The wells should be periodically cleaned out and each should be provided with a waste-water conduit connected to the nearest street drain. It appears necessary that the municipal committee should prepare a comprehensive plan of street drainage for the whole town, the work to be carried to completion on the lines of the plan gradually as funds become available.

DINANAGAR TOWN (GURDASPUR DISTRICT),

Inspected on 27*th December* 1880.

Chief sanitary defects, and suggestions for improvement of same.

The streets are mostly paved, leaving a small drain on either side. The paving is in bad repair; one or two shop-counters were built over the drains. Crowds of vegetable-sellers through the street interfering much with traffic. A space (there are plenty spare sites) ought to be set apart for a vegetable market.

The drains after leaving the town-wall are uncared for. Their contents are allowed to flow anywhere and all round the town; the smells are most abominable and the place most filthy. Gardens are cultivated quite close up to the town-wall.

Remarks by Sanitary Commissioner.

The recommendation of a circular road round the town is worthy the consideration of the municipal committee. The other defects reported require their immediate and serious attention.

A circular outfall drain tailing off to fields at a distance would remedy the present evils complained of. Public latrines should be established.

The filth stores should be enclosed within low mud walls and be made the receptacles for all manner of filth and refuse matters, town-sweepings, latrine ordure, slaughter-house offal, &c., &c.

The stuff collected in them should be sold for the benefit of the municipal funds. It is a valuable marketable commodity and should be treated as such. If so treated, the search to collect as much as possible will result in improved scavenging and increase of municipal income.

The conservancy establishment requires to be more carefully supervised. The Inspector should be held responsible for its efficient working.

The wells should all be put in order and provided with waste-water conduits to the nearest street-drains. Recommends that the serious attention of the municipal committee be drawn to the discreditable sanitary condition of their town, and the urgent necessity of their exerting themselves to remedy the evils brought to notice in this report. A very great improvement may be easily effected by a proper organization and supervision of the conservancy arrangements. If all the town-sweepings and other kinds of refuse matters are systematically and economically collected in manure godowns as suggested above, the working staff may be made to a great extent self-supporting by the income received from the sale of the town refuse as manure.

BAHRAMPUR TOWN (GURDASPUR DISTRICT),

Inspected on 10*th January* 1881.

Chief sanitary defects, and suggestions for improvement of same.

The streets are paved and the drains discharge on the ground at the different gates. At one gate there is a favorite well and the street-drain discharges close by, the consequence being that to get to the well one has to wade through a large quantity of stinking mud and this goes on from year to year. The town is built on high ground bordering the Kirin, which is a long tract of swampy ground stretching through the Gurdáspur District.

There are no large sewers in the town. The small side-drains are filthy, and shop-counters are just over the drains.

The town-sweepings are collected at several places generally at each town gate, and, when large enough, is sold and taken away by contractors. The amount realized by sale of sweepings usually comes to about Rs. 50 per annum. There are no latrines in use for the public, and the private latrines were in every case that I inspected most filthy. People resort to the neighbouring fields for purposes of nature, and as the country around is low-lying and swampy the smells are at times abominable.

Water-supply is from well, which are as a rule in bad repair. Those in the street have almost all the street-drains passing close to them. The paving near the wells from much usage has become completely broken down, the consequence being that drains discharge their sewage into the ground near the wells, and pollute the water. Wells are never cleaned by the municipality, but at the pleasure of the people living near them.

Remarks by Sanitary Commissioner.

The conservancy of this town is apparently sadly neglected. Recommends that the attention of the municipal committee be invited to the remarks of the Civil Surgeon regarding the very unsatisfactory condition of the wells and street-drain. The establishment of one or more " gobar godowns " and the re-organization of the sweeper staff are important and pressing requirements. With proper management the town refuse, &c., should yield a very much larger sum than that at present realized. The establishment of public latrines is a question for the consideration of the municipal committee and should be introduced as soon as possible.

KALANAUR TOWN (GURDASPUR DISTRICT),

Inspected on the 13th January 1881.

Chief sanitary defects, and suggestions for improvement of same.

The streets are mostly paved but the paving is much in want of repairs. The drainage is received by the Kirin when full, but, as a rule, it soaks into the sand near the end of the drains on the outskirts of the town.

The drains inside town are the usual square shaped ones, and they are apparently seldom cleaned, being all abominably filthy; as a rule, the drains are all carried close to the wells, and, as these places are much used, the paving has given way and not been repaired, sewage must reach the drinking-water from this source. The shop-counters are built over the drains. The houses in several of the principal streets are three or four storeys high, and from each storey is seen an outshoot discharging both cook-room and dirty waters of sorts. These shoots generally swarm with flies after trickling down the houseside, the discharge is received by the street-drains, and in many cases it joins these close by a sweetmeat-seller's counter. There the flies were in legion, and the smells most noxious. The principal outfall open sewer of the town passes close to the school and the children are to be seen at their lessons on its bank. This drain discharges into a sandy field about 300 yards from the gate of the town. At this season the sewage had all dried up just after passing the school.

Remarks by Sanitary Commissioner.

The very faulty conservancy arrangements are apparently largely due to the neglect to provide manure godowns or "gobar godowns." The municipal committee should at once introduce these mud-wall enclosures at convenient sites outside the town, and constitute them the established receptacles for all sorts of town filth and refuse, the same to be carefully collected from all quarters and sold as manure or kiln-fuel for the benefit of the municipal funds.

The wells should all be connected by waste-water conduits with the nearest street-gutter, and the bhistís (water-carriers) should then have no difficulty in flushing the street-drains.

The slaughter-houses should be put in order and their offal, &c , be regularly added to the contents of the manure godowns. The attention of the municipal committee should be invited to the Civil Surgeon's advice regarding the sweet-water wells, and to the question of providing public latrines for the town.

BATALA TOWN (GURDASPUR DISTRICT),

Inspected on 17th and 18th February 1881.

Chief sanitary defects, and suggestions for improvement of same.

Streets are mostly all paved, but the drains have no proper flushing apparatus, and the occasional wiping they get from the bhisti does not clean them. A well with flushing tank at upper part of town could easily be arranged. Almost all the drains at the lower parts of the town were choked with sewage matter, and in several places smelt abominably. The street-sweepings are collected all round the town on the roads leading to villages. Contractors dispose of it to brick-burners and kitchen-gardeners. There is a broad belt of kitchen-gardens extending almost all round the town, and the town drainage and sewage is most utilized in them. There is no proper place set apart for the collection of filth ; the contractors put it down on the roadsides at pleasure.

Remarks by Sanitary Commissioner.

Recommends that the attention of the municipal committee be invited to the Civil Surgeon's remarks respecting the collection of town-sweepings, &c., on the roads round about the town, with the view to their adopting measures to prevent this very objectionable practice. It is not stated what sum the contractors pay for town-sweepings, &c., but there is no doubt that the municipal committee might realize a handsome income by the collection and sale of town filth regularly and systematically. They should establish two or three mud-wall enclosures (manure stores) at convenient sites round the town, and in these collect every sort of filth, town-sweepings, stable litter, house garbage, latrine ordure, carcases of dead animals, &c., and sell the stuff as manure or kiln fuel for the benefit of the municipal funds. A town of the size of Batála should yield from the sale of its sweepings, &c., with the existing demand for kiln-fuel and field manure, at least Rs. 1,800 a year; reckoning the out-turn of material at the rate of 5 sérs for each, of say 4,000 houses (and this taking house and street sweepings, latrine and slaughter-yard refuse, &c., is not too much as an average per house), and its selling price at 100 maunds or 50 loads per rupee. Usually it is more expensive, and in this town probably the rate may be only 50 maunds the rupee, which would double the above income. It is well worth the trouble of the municipal committee to study this subject and to follow the very successful and profitable example set by Amritsar in this matter.

SRIGOBINDPUR TOWN (GURDASPUR DISTRICT),

Inspected on 31st March 1881.

Chief sanitary defects and suggestions.

The streets are mostly paved and drained. The paving of the whole town is nearly, and in some places quite, worn out. The drains are all single, that is, they run down the centre of the streets and about three-fourths of the whole discharge into a large excavation which lies to the west of the town. The road leading from the Thana to the town forms a " band " across the natural outlet of this place, and in consequence there is a large collection of filthy foul-smelling water always in close proximity to the town. The water is really the town sewage, and in it the inhabitants bathe, wash their clothing, make bricks, water cattle, and on its borders, especially on the road leading from the Gurdáspur road to the Thana they ease themselves. The town-sweepings are not looked after and made the source of profit they might be. They are thrown down at the different gates and a contractor is supposed to take the heaps away daily, but this is seldom done, and at several points round the town these dirty heaps may be seen in some places blocking up the streets. At one time Rs. 200 was received for sweepings, but now only Rs. 50 is forthcoming. Were proper steps taken to collect and store all the town-sweepings in proper and well-placed godowns, the present extensive nuisance would be got rid of, and the municipal income would in my opinion be much increased. The remainder of the drains (about four) discharge into fields in the neighbourhood of the town with benefit.

Remarks by Sanitary Commissioner.

The sanitary condition of this town is evidently in a very unsatisfactory state. The town drainage which is described as obstructed by the Thana road might be passed across it under a bridge perhaps. Recommends that the attention of the municipal committee be invited to this point. The neglected conservancy is not creditable to the municipal committee. It is not understood why the income derived from sale of town-sweepings should have fallen from Rs. 200 to Rs. 50. The construction of proper godowns (mere mud-wall enclosures) for collection of all manner of town filth, &c., and its sale for benefit of municipal funds, should produce enough to make the conservancy establishment self-supporting. If the stuff cannot be sold, it should be destroyed in the godowns by fire.

The wells apparently require waste-water conduits to connect with the nearest street-gutters.

In laying down new pavement or remetalling of the streets, the roadway should be convexed and provided with surface-gutters at each side.

VILLAGE SHEKOPURA (GUJRANWALA DISTRICT),

Inspected on 1st and 2nd October 1880.

Chief sanitary defects, and suggestions for improvement of same.

What is most wanted is some system of conservancy and drainage, as well as the widening and opening out of the streets and lanes. At present there is but one narrow (scarcely 6 feet in width) street, with a broken brick pavement which intersects the town about its middle. The rest are all crooked lanes, two-thirds of which end in cul-de-sacs, and along which the circulation of fresh air is impossible. All the filth and refuse mixed with ordure lies in heaps in every direction, just wherever the occupants can most conveniently throw it from the entrances to their houses. Whatever refuse has been removed from the streets and lanes has been used to fill up a pond of water in order to render the approach to the east entrances feasible after rain. The pond consequently is rendered a cesspool, the exhalations from which poison the air of the entire neighbourhood all the year round.

Remarks by Sanitary Commissioner.

The fact of there being no conservancy establishment in this town explains the very unsatisfactory state of its streets as described in para. 3.

I would recommend that the lambardárs be called upon to arrange for the filling up of the pond at the east entrance of the town with fresh earth by a special work carried to completion straight off. They should also select sites outside the town and enclose them within low mud walls, and then direct the people to carry the refuse and sweepings of their houses to them, instead of, as at present, casting all filth, &c., into the nearest street. These are very simple and practicable measures, and would at once effect a marked improvement in the sanitary condition of this town.

EMINABAD TOWN (GUJRANWALA DISTRICT),

Inspected on 20th November 1880.

Chief sanitary defects, and suggestions for improvement of same.

1. The Muhammadan burial-ground on the east side of the town, a portion of which is actually inside the circular road, should at once be closed.

2. The houses in ruins rebuilt or removed.

3. The ruins of arches and walls across some of the streets should be pulled down, so as to open up the free circulation of air.

4. The conservancy establishment should be increased, being insufficient.

Most of the streets are paved with brick on edge, with shallow open drains on each side. Repairs are urgently needed in many places. Many of the smaller streets and lanes were very filthy, not having been swept or cleaned for days.

Although there is a municipal committee, no proper system is adopted. As the centre of the town is slightly elevated, all fluid sewage and rain-water gravitates towards the holes and hollows outside the town. The sides of the streets and lanes being the only channel of escape, dirty black gutters and sickening stenches are not unfrequent. There appear to be no fixed houses or places for the removal and storage of the street sweepings and refuse.

Remarks by Sanitary Commissioner.

The attention of the municipal committee should be called to the highly unsatisfactory state of the conservancy of their town as pointed out by the Civil Surgeon. No statement is given of the income of the municipality, but, if possible, provision should be made for an increase to the staff of sweepers. Perhaps some income might be derived from the sale of town sweepings and refuse, especially if the collection of this stuff is earnestly taken in hand by the committee and the material stored as manure in low mud-wall enclosures at convenient sites outside the town.

The sanitary condition of the town as here discribed is discreditable to the members of the municipal committee. No real improvement in this direction can take place till these gentlemen give their attention to the matter. There can be no difficulty in arranging for the collecting of filth, litter, &c., in the appointed enclosures outside the town, nor should there be any difficulty in its disposal by sale as manure or fuel for kilns. The great difficulty seems to be to secure the good offices of the municipal committee in behalf of the interests of their fellow-townsmen, of which they have charge.

VILLAGE OF KILLA MEAH SINGH (GUJRANWALA DISTRICT),

Inspected on 29th November 1880.

Chief sanitary defects and suggestions.

Some arrangements should be made for the removal of the filth and human ordure lying in heaps through every street and lane of the village. Levelling or rebuilding the houses in ruins, which are, at present, nothing else than latrines. Filling up all holes and hollows, and preventing the excavation of earth inside and also a certain distance outside the circular road, and prohibiting nuisances within certain fixed boundaries round the village.

Remarks by Sanitary Commissioner.

The attention of the lambardárs should be called to the very unsatisfactory state of the village conservancy as described by Dr. Quinnell, and to the necessity of their exerting themselves to get the rules regarding collection of sweepings and refuse matters at appointed sites outside the village early enforced. The sites selected for this purpose should be at once walled in, and the villagers (except those who regularly, every three or four days, carry their sweepeings and litter away to their own fields) should be prohibited from casting filth, rubbish, &c., anywhere else but in these enclosures.

The pits and hollows referred to should be filled with fresh earth and not stable litter, as is usually done. The ashes, &c., of old brick-kilns, if close at hand, may be conveniently filled into these pits.

The state of the Persian-wheel well is very probably owing to the decay of the cordage or woodwork of the apparatus for drawing water. This should be seen to, and the cordage be removed, if necessary. Bathing should not be allowed at any well which is not safely protected by a parapet or platform.

JALALPUR TOWN (GUJRAT DISTRICT),

Inspected on 21st January 1881.

Chief sanitary defects, and suggestions for improvement of same.

There are three irregular excavated depressions, two on the west side and one on the south side of the town, which receive storm-water, and are stagnant pools of foul water in which men and animals enter. Men and cattle sleep in the same unventilated rooms.

There is one main street running from west to east which is paved with shallow side-drains. And three lanes which pass through the town are also paved and drained ; besides these there are several narrow unpaved blind lanes.

The pavements and drains are broken up a good deal. And Rs. 500 have been sanctioned for the repair of the main street.

The people generally go afield or visit the latrines. Private sweepers in mohallas carry away the dry sewage from house latrines to the field, where it is cast abroad. There are no urinals in use.

The side-drains along the paved street convey storm-water through several outfall drains. But the drainage is received into depressions just outside the town, where it stagnates. These cesspools are free to men and animals and are dangerous to health. These streets are swept by the committee establishment, while private sweepers carry away the dry sewage to the fields.

Remarks by Sanitary Commissioner.

The conservancy arrangements are evidently capable of much improvement. Rs. 35 a year for the refuse matter of a town of 14,000 inhabitants is a merely nominal return for the real value of the stuff.

I would recommend that the municipal committee be invited to consider this subject with the view to the establishment of manure godowns for the reception of all town refuse, latrine soil, &c., for sale as manure for the benefit of the municipality. The greater amount thus collected will not only ensure a handsome income to the municipality, but also at the same time effect marked improvement in the purity of the streets and general atmosphere of the town.

KUNJAH TOWN (GUJRAT DISTRICT),

Inspected on 10th February 1881.

Chief sanitary defects, and suggestions for improvement of same.

Overcrowding—men and cattle sleep under the same roof, excepting in six or seven instances ; this evil should be discouraged.

There are three excavations which receive storm-water close around the town. Two are now dry, one contains a foul pool. Men and animals enter freely when these are full of water, but the entrance of human beings into these pools should be discouraged. Heaps of dung and sweepings are seen near the houses; these should be removed. One main street runs through the town. Five narrow winding lanes also pierce through, and there are sixteen blind-alleys.

The main street is paved, and a portion of some lanes with side-drains. The pavement is broken up a good deal.

The sewerage is dry. The drainage is effective because of this being a raised site, but the extension of pavements with drains is desirable, especially on the south side, where the drainage is arrested.

The people go afield for purposes of nature; the sweepings of the streets are sold and have yielded 28 rupees this year.

Remarks by Sanitary Commissioner.

The sum of Rs. 28 realized by sale of a year's collection of town litter, &c., shows that somebody derives great benefit at the expense of the municipality, and the inefficient strength of the conservancy establishment indicates a want of due attention to this important branch of the duties of the municipal committee. In a town of over 1,300 dwelling-houses, supposing each house on the average to produce only 5 sérs of litter and refuse taken together with the public streets, there would be a daily accumulation of 162½ maunds of manure material for conveyance to the godown, and this, at the selling price of 20 loads or 40 maunds per rupee, would produce about Rs. 4 a day, or say Rs. 1,460 a year. If the municipal committee would treat this stuff as a marketable commodity, and collect it expressly to sell, they would effect a vastly improved state of conservancy, and gain a large income into the bargain—an income which, if it did not pay for all conservancy charges, would go far towards doing so.

The latrine and slaughter-house filth is apparently appropriated by somebody free of cost, and to the detriment of municipal funds. All this stuff should be added to the manure godowns and turned into money by the municipal committee.

VILLAGE MANGOWAL (GUJRAT DISTRICT),

Inspected on 12th February 1881.

Chief sanitary defects and suggestions.

Overcrowding—men and cattle sleep under the same unventilated roofs, excepting the Khatries.

Dung-heaps and sweepings are kept near the houses. Cattle-pens might be erected for the protection of cattle at night in the cold months.

The dung-heaps should be removed and their accumulation discouraged.

The drainage depression around the village is filled by overflow from the Bhimber in which men and animals enter freely. The entrance of the former into the water, which soon stagnates, should be discouraged.

Remarks by Sanitary Commissioner.

The establishment of manure stores should be urged upon the attention of the lambardárs. The number might correspond with that of the village " mohallas," and the contents be divided at each season under the supervision of the lambardárs amongst the contributing houses. The mud-wall enclosures for this purpose need not be at all expensive. The wall itself should be only 2½ to 3 feet high, and is meant as a protection to the manure material as well as a limit to the site itself. A square shape is preferable to a round one.

DINGAH TOWN (GUJRAT DISTRICT),

Inspected on 23rd March 1881.

Chief sanitary defects and suggestions.

There are eight permanent streets for free perflation and six blind-lanes. All the former are paved with either side or central drains in fair order.

Sewerage dry. The drainage is satisfactory and the storm-water enters excavations and natural depressions on all four sides of the town, where the drainage from the Pahi hill rests for long periods, and these contain stagnant water now.

The Deputy Commissioner was in camp here, and issued orders through the Tahsíldár to discourage inhabitants from entering these pools at all, and to reserve them exclusively for cattle, &c. There is a kutcha tank a few hundred yards to the west of the town, shaded by trees, which has been reserved for the people, to the exclusion of all animals. There are no urinals in the town.

The people generally go afield; those who can afford to have private latrines keep them clean by private sweepers. The sweepings and animal dung are sold, and brought an income of Rs. 230 last year. There are places outside the town for the storage of the sweepings, where they are conveyed twice daily. There were no filth heaps inside the courtyards of houses, and the streets were cleanly swept. Cow-dung was stored in courtyards and on house-tops. The people were advised that the latter position was less objectionable for storing dry dung than the former.

Remarks by Sanitary Commissioner.

Recommends that the attention of the municipal committee be invited to the remarks of Civil Surgeon on the state of their town with the view to adopting measures in consultation with the Civil Surgeon to remedy the defects pointed out. The pools of stagnant water outside town should be protected and reserved for use of cattle only, the people using the kutcha tank alluded to.

The construction of manure stores and income of Rs. 230 from sale of town-sweepings is very satisfactory and encouraging. By careful collection there is no doubt the amount can be largely increased, especially if latrine filth and slaughter-yard offal, &c., be added to the general store in the regular enclosed godowns. If well treated with dry earth, there is no objection to the immediate addition of latrine soil and offal, &c., to the contents of the manure godowns, and it will save expense of separate trenching and ultimate loss of material. If the godowns are of sufficient size, say 3 or 4 each, 50 or 60 yards square, there need be no difficulty in collecting the latrine and slaughter-yard filth in one corner till converted into poudrette, or it may be mixed up into the general mass of filth. The wells should be periodically cleaned out, and they should all be furnished with waste-water conduits emptying into the nearest street-gutter. The latrine sweepers should be provided with the necessary tools to remove soil, *viz.*, hand shovels and baskets, and it should all be added to the godown contents.

Miscellaneous.—Under this head Civil Surgeon should state, in detail, sources of income and heads of expenditure.

The Civil Surgeon should himself, as often as possible, examine the registers of births and deaths, and point out defects to the municipal committee.

AHMADPUR TOWN (JHANG DISTRICT),

Inspected on 12th December 1880.

Chief sanitary defects, and suggestions for improvement of same.

There is one small bazár in the town and several crooked lanes; none of the streets or lanes is paved. There is no regular drain, except one which is connected with the Sanval Shah's well, from which it carries away the refuse water with which the people have bathed in its front. This drain, though pucca and well-made, requires attention to keep it clean. Water of another well soaks in the adjacent ground. The waste-water from the private houses soaks in the compounds or even in the places where people sleep; rain-water finds its way out. There is no hollow inside the town, but outside it collects in the low ground on its north and east and in the bed of an old stream on its south.

The Civil Surgeon suggests—(1) The wells inside the town that are worked by Persian-wheels and where people bathe should have masonry drains connected with them.

(2) In other places sinks may be provided to receive the waste-water, from which sweepers may daily take it away.

(3) The streets and lanes should be paved as funds permit.

(4) Some provision may be made to carry the rain-water away from, and to prevent the river water from coming to, the town walls.

There is no regular system of sewerage or drainage, nor is it necessary in a town like this, where the daily use of water inside the town is scanty, and where, as a rule, people go to ease themselves outside in the fields.

The dwellers in private houses deposit their sweepings, solid excretions voided by children, &c., in front of the houses, whence they are daily removed by the public sweepers to places outside the town. But these places for storage of manure are not fixed, and heaps of filth are seen close to the walls on all sides of the town. The manure is sold at Rs. 60 per annum. Though most people go out in the distant fields, yet many seem to make themselves comfortable close to the walls, and even in the ruined houses and secluded corners. The cattle are mostly tied inside the houses, but only in a few places under the same roof where men sleep, and most of these cattle houses are very damp and filthy.

For defects under this head I beg to offer the following suggestions :—

1*st.*—The rubbish, &c., should only be deposited in four or five fixed places beyond 200 yards from the town walls, and within this distance nobody should be allowed to perform the offices of nature.

2*nd.*—The people may be made to keep their cattle houses clean and dry.

3*rd.*—The ruined houses and secluded corners, though far cleaner than at my last visit, require more attention and labour of the conservancy establishment.

Remarks by Sanitary Commissioner.

Recommends the adoption of "gobar godowns" or manure stores for the collection of town filth, sweepings, litter, &c., of all sorts, and its sale for benefit of municipality. If this were economically managed, the income thus derived would pay for a larger scavenging establishment than is at present entertained.

Recommends that the coping of the wells be attended to at once, and parapets built where necessary.

CHANIOT TOWN (JHANG DISTRICT),

Inspected on 25th December 1880.

Chief sanitary defects, and suggestions for improvement of same.

Like most towns of the Punjab, the streets here are not straight and regular. Three principal bazárs have been paved with broken bricks and two "gallies" with entire bricks. These places have also been provided with side-drains, but the drains are angular and have no good slope. The rest of the town is unpaved.

When funds allow, good brick pavements and drains, with a proper degree of slope, should be constructed. There are a large number of wells to flush the drains, which should be connected with them.

Most of the rain-water of the town collects in smaller or larger excavations in and immediately outside the town. Some, or a small portion only, finds its way some distance from it Some of the excavations are very large, and have resulted from people digging up the earth for building purposes, and for manure, as it is impregnated with excrementitious matters. The daily waste water from the houses soaks in and about them.

As to the arrangement for the disposal of excretions, sweepings, &c., most people go out to fields but not beyond any fixed boundaries. In many places human excretions are found quite close to the town walls. Some "Pardah Nishins," the aged, and the infirm, are all obliged at night-time to ease themselves within the town. Some 30 houses are provided with privies, while the inmates of the remaining houses resort to the tops of houses, ruined houses or secluded corners. These deposits are exposed to view for days before they are removed. The excretions of children, &c., along with the sweepings are every morning placed immediately outside each house, whence public sweepers remove them to 30 appointed places in the town. From these places the rubbish, &c., is removed by such cultivators as have previously arranged with the contractor to remove them. If these fail to remove the collections, the public or municipal sweepers are supposed to take them out of the town to some 10 fixed sites, whence ultimately the contractor removes them at his will. The contractor pays Rs. 225 per annum. The liquid excretions passed in the town (and there is a great deal of these passed by cattle in and before the houses) partly evaporate, and partly soak in the town.

The above arrangements are very complicated, and indeed do not work well. The town is filthy, and Rs. 225 realized from manure is comparatively a small sum.

The Civil Surgeon, Rai Bahádur Chetan Shah, makes the following suggestions :—

1*st.*—That limits should be defined at 200 yards from the town walls, and within these limits nobody should be allowed to ease himself.

2*nd.*—No manure or sweepings should be allowed to be stored within the same limits.

3rd.—Four or five sets of latrines, for females at least, if not for men, should be provided in different directions outside the city. Manure should be sold to a contractor from storage places where it should be collected by the municipal sweepers: removal of filth from the town should never be left to the zamindárs' men, who obtain a lease from the contractor, but who never can be expected to remove it with any regularity.

4th.—People should not be allowed to dig up earth from within and immediately outside of town, either for building purposes or for manure.

5th.—Some measures may be devised for filling up the present excavations, but I am afraid some of them are too big to be thus dealt with. Endeavours may be made to confine the water that may collect in them within narrow limits.

6th.—The cattle should not be allowed to be tied before the houses on the public passage in any alley; and wherever they are tied people should be advised to keep the place clean and dry.

7th.—The present staff of conservancy (*vide* para. "Conservancy Establishment") is very inefficient and should be greatly augmented. They should be strictly looked after; and all the public passages, deserted and secluded corners, and ruined buildings, should be kept clean.

Remarks by Sanitary Commissioner.

Recommends that the municipal committee of Chaniot be invited to consider the various suggestions made by the Civil Surgeon, Jhang, for the improvement of the sanitary condition of their town, at a meeting specially convened for the purpose, with the view to the early adoption of measures to carry out the proposed remedies.

Regarding the more efficient organization of the conservancy establishment, the Civil Surgeon might be asked to furnish a detailed plan for its working under the proposed new system.

VILLAGE BHAN (JHANG DISTRICT),

Inspected on 6th March 1881.

Chief sanitary defects and suggestions.

1st.—Bad conservancy, to which the lambardár should pay attention, by seeing that all people sweep their respective places and take away the sweepings and the filth to the godowns appointed at 300 paces from the village walls, and that no people go to ease themselves within boundary-marks fixed at the same distance.

2nd.—Unprotected wells, which should be protected by proper parapets, and sufficiently high "*chanas*," or wooden planks on the side of the well where bullocks work.

3rd.—Bad registration, for which the chowkidár may be punished, and the Thána Moharir, who has neglected even to point out the proper pages where entries are to be made, may be asked to explain his neglect.

Remarks by Sanitary Commissioner.

Recommends that the attention of the Deputy Commissioner be invited to this report, and that, in communication with the Civil Surgeon, the simple suggestions made be adopted and carried into effect.

The chowkidárs being illiterate men require to be verbally instructed as to the manner of having the entries recorded in their birth and death memorandum books.

The construction of manure godowns is a very simple affair, and the lambardárs could easily arrange for the villagers daily removing their house sweepings, litter, &c., to them.

The parapets for wells used for drinking purposes inside the village should be provided without delay.

PAKPATAN TOWN (MONTGOMERY DISTRICT),

Inspected on 11*th February* 1881.

Chief sanitary defects, and suggestions for improvement of same.

Such portions of the main street as may be said to be between the outer and inner gateway of the town, are in good order, bricks on edge with proper outward slopes to drains at sides.

The older pavement of the rest of the main streets are in bad order, and the side-drains, where provided, are so broken up as to be impossible to keep clean; this especially applies to the main bazár, where, of all places, it is so necessary to have the drains clean; this street is only from 7 to 8 feet wide.

Repavement of this street with improved pattern drains recommended; this done, every year a new portion should be taken up.

Sewage imperfectly removed from drains, in fact there is no system; when the filth consists of something solid enough to scrape up by the broom, it is thus thrown up on to the sides of the drains and removed with street sweepings. I saw no signs of any one of the drains having been washed.

The sweepers carry all they can to the storage places allotted for this purpose, which are simply choked with filth accumulations of two years at least, and throw what cannot be removed over the side slopes of the town.

The drainage in consequence of the great height of town is good. Eventually rainfall finds its way to the "Basharat Nullah," a capital outlet if kept clean; this Nullah however is dammed up in various places by the zamindárs, so as to hold rain-water, which they use for irrigation. This would interfere with its usefulness in the event of any very heavy fall, which is hardly to be expected.

The conservancy is entrusted to five sweepers in town and one in tahsíl, besides one to each latrine.

The bhistís have only recently been appointed, and appear to be employed on other works.

The defects are—

1. Want of a proper system to work on and a supervising officer to see to same.
2. Paucity of establishment and small wages.
3. Latrines for females at present under charge of male sweepers.

Remedy to meet defects I should propose for town conservancy—

8 Sweepers on Rs. 4 each, instead of 5 on Rs. 3 each.
1 ditto „ „ 5 ditto 1 „ „ 4 „
2 Bhistís „ „ 5 as now.

6 Sweepers, each provided with a donkey and usual appendages at expense of committee, should be responsible for the streets.

2 Sweepers with bhistís should be employed in cleaning and washing drains.

The Moharrir of the committee should spend two or three hours, morning and evening, supervising this work.

The Náib Tahsíldár should go round once daily to see the work is properly done, and to report in writing, in form of journal, all delinquencies to Tahsíldár.

The establishment above proposed should be in addition to any allowed by rule to the Tahsíl.

For each set of male and female latrines, man and wife should be employed on Rs. 7, instead of two men on Rs. 6, as at present.

Employment of conservancy establishment on miscellaneous work, unconnected with their legitimate duties, which is very common, should be prohibited.

Remarks by Sanitary Commissioner.

Recommends enquiry being made as to why the accumulation of material in the manure godowns is not sold. If really not saleable, the stuff should be destroyed by fire.

The suggestions of the Civil Surgeon regarding the remodelling of the conservancy establishment should be brought to the notice of the municipal committee, whose duty it is to supervise its proper working instead of transferring this duty to the Tahsíldár. The irregular employment of the conservancy establishment on other than their proper duties should be prohibited. The conservancy arrangement of this town are evidently much neglected.

The Civil Surgeon's remarks regarding the town wells should receive the immediate attention of the municipal committee, and if not capable of being rendered wholesome, they should be closed to use altogether. It appears that the principal supply is already drawn from wells outside the town.

The state of the public latrines as described is discreditable to the municipal committee. They should be put in proper order, and ordure sold as manure.

Whatever site is selected for slaughtering cattle, the offal, &c., should be added to the stock of stuff in the manure godowns for sale, or destruction by fire.

The burying of bodies in and about the town should be strictly prohibited, and the extramural cemeteries should be enclosed and provided with paths as suggested by the Civil Surgeon.

The Civil Surgeon's remarks about the tannery and the very objectionable and unwholesome practice of digging holes for building purposes should be brought to the serious notice of the municipal committee. Civil Surgeon's recommendation for the disposal of town refuse, &c., in kiln work by the municipal committee is worthy of attention and trial. The want of interest in sanitary matters on the part of the municipal committee is much to be regretted. The members should understand that the improvement of the sanitary condition of their town is among the most important of their duties.

KOHAT CITY.

Chief sanitary defects, and suggestions for improvement of same.

The drainage is not satisfactory; the streets are clean but many of them irregular. I consider that any change in either of these headings would entail a very large expenditure.

The sewers and drains empty themselves chiefly into an irrigation canal, and finally into the river.

Conservancy arrangements are conducted by one jamadar, 2 daroghas and 24 sweepers. There are 4 filth carts, and 4 more have been ordered. The filth is removed into fields at a distance from the city.

Remarks by Sanitary Commissioner.

The Deputy Commissioner having seen this report and entered his remarks thereon, I would request that the drainage and water-supply schemes mentioned as being under preparation be first submitted to this office for examination before they be put into execution.

Errors committed by Army Sanitary Commission in its review of Punjab Sanitary Report for 1878 pointed out.

I reproduce in this report, for the information of the Army Sanitary Commission, extract para. 2 from my letter No. 162, dated 11th January 1881, to Secretary to Government, Punjab, pointing out two errors that had been committed, apparently through oversight, by the Army Sanitary Commission in its review of my Sanitary Administration Report for 1878.

Para. 2. "In perusing the Army Sanitary Commissioner's review for 1878, I observe that two errors have been committed, apparently through an oversight, which I deem it advisable to bring to your notice. At page 12, para. 15, line 7 it is stated—' Dr. Courtney, while acting as Deputy for Mr. Bellew.' Dr. Courtney having acted, as you are aware, not as Deputy, but as Sanitary Commissioner during my absence on Political duty in the month of September 1878.

"Again, page 13, para. 17, line 5— ' and Dr. Courtney states that surface cleaning, &c.' From this and the remarks that follow in this para. it would appear that the Army Sanitary Commission is under the impression that Dr. Courtney inspected all the towns and villages entered in the Sanitary Report for 1878, whereas that officer only inspected the Simla sanitarium, the rest of the work of inspection having been performed by myself alone."

Dr. Cunningham's Sanitary Primer.

Dr. J. M. Cunningham's Sanitary Primer has been translated into Urdu by Khan Bahadur Rahim Khan, Assistant Surgeon. 7,000 copies were supplied to this office by the Punjab Government, of which number 4,000 have been freely distributed in all the districts of the Province. Arrangements, I understand, have also been made by the Director of Public Instruction to introduce the study of the Primer in all the Punjab schools.

In conclusion I have to acknowledge, and record my thanks for, the very cordial assistance and intelligent co-operation afforded to me at all times by the several district authorities with whom my duties have brought me into communication during my recent cold-weather tour of inspection. I would beg, in particular, to record my acknowledgments of the very valuable and praiseworthy services rendered in the cause of sanitation and vaccination by E. O'Brien, Esq., Deputy Commissioner of Muzaffargarh, G. E. Wakefield, Esq., Deputy Commissioner of Ludhiána, Major T. C. Plowden, Deputy Commissioner of Kohát, and Major E. Macaulay, Deputy Commissioner of Dera Ismail Khan.

It is very gratifying to notice that my suggestions for the improvement of town and village conservancy have almost everywhere been well received by municipal committees and village headmen, and though there are many difficulties to be overcome, the careful attention which is now given to the subject inspires hope of some general practical results being achieved before very long.

In the Muzaffargarh District particularly, I observe that very marked improvement has already been effected in most of the towns and villages recently inspected by me. Through the medium of the Tahsíldárs and other influential official and non-official members of the community, the people are being instructed by vernacular written instruction how to proceed and act upon the Sanitary Commissioner's suggestions, and I think the plan adopted here is well worthy of imitation in other districts of the Province.

In compliance with the instructions conveyed in para. 6 of Resolution No. 150 of the Government of India, dated 15th March 1880, a circular was issued to all Civil Surgeons, together with a certain number of printed forms of inspection reports for municipal towns and villages separately, in September last. The result has been a certain amount of improvement in local sanitary inspection in some districts, but still the amount is very far short of what it should be for the Province as a whole, as will be seen by reference to the list of inspections made by District Medical officers given on page 76.

Surgeon-Major Bateson, Civil Surgeon, Umballa, Dr. Quinnell, Civil Surgeon, Gujránwála, Dr. Deane, Civil Surgeon, Gujrat, and Assistant Surgeon Chetan Shah, Rái Bahadur, Civil Surgeon, Jhang, have done creditable work in the inspection of towns and villages in their respective districts during the year under review. Assistant Surgeon Chetan Shah's services have several times been brought to the notice of Government, and I can say little more than endorse the eulogium passed on him by the Commissioner of the Mooltan Division.

The system adopted by this officer of addressing the headmen and principal residents of the villages he inspects at the time of his visit, pointing out to them the defects of their sanitary surroundings and the simple means of their remedy, and instructing them through the medium of friendly discussion in the advantages to be derived from attention to sanitation and the observance of domestic conservancy and hygiene, is highly creditable to him and commendable as an exemplar for all District Surgeons. It not only enlightens the people on a subject regarding which they are profoundly ignorant, but disarms prejudice and engenders confidence in the good intentions of Government.

Assistant Surgeons Sodhi Fatteh Singh, Civil Surgeon, Siálkot, and Rádha Kishan, Civil Surgeon, Karnál, have also done creditable work in sanitary inspection. I beg to bring the services of all these officers to the favourable notice of Government.

In some of the large municipal towns endeavours are being made to improve and re-organize the existing conservancy establishments in accordance with the suggestions offered by the Sanitary Commissioner with the object of remedying the sanitary defects brought to notice by him. From Mooltan, a very interesting and intelligent report by a sub-committee on the measures proposed for the better working of the existing conservancy arrangements of that city, has recently been received in this office from Mr. W. A. Harris, the Secretary, Municipal Committee. Some of the conservancy rules in force in the city of Amritsar have, I observe, been recommended for adoption at Mooltan ; this is a step in the right direction, but I think the municipality would find it more profitable and more efficacious were they to adopt the Amritsar system in its entirety, and once for all do away with the at present obstructive personal interests of a few private individuals for the benefit of the municipal community. The great obstacle at Mooltan, as in some other municipal towns, to the establishment of a thorough and efficient city conservancy is the private interest of a few persons who benefit by the gratuitous appropriation of street sweepings and house refuse for use as manure on their fields. There is no reason why the Mooltan Municipality, as has been done by Amritsar, Ludhiána, and some other towns, should not monopolize this marketable commodity and by its systematic collection and sale make their conservancy establishment more than entirely self-supporting.

The following native gentlemen have been recommended to me by various District Officers for conspicuous zeal and energy in sanitary matters, and I would beg to solicit that their services may be recognized in some tangible manner by the Local Government:—

Names of officials and non-officials in each district of the Province whose services in the cause of Vaccination and Sanitation have been brought to the notice of Government by SURGEON-MAJOR H. W. BELLEW, C.S.I., *Sanitary Commissioner, Punjab.*

District.	Name.	Occupation.	Place of residence.
Gurgaon	Umrao Khan	Zaildár	Sohna
Karnál	Rái Rajah Lal	Extra Assistant Commissioner	Kaithal
Ditto	Kazi Ghulam Nabi	Member of Municipal Committee	Ditto
Ditto	Hakím Faizulla Khan	Ditto ditto	Kunjpura
Ditto	Mir Muhammad Husain	Ditto ditto	Karnál
Ditto	Nawáb Sham Sher Ali	Ditto ditto	Ditto
Ditto	Munshi Amir Ali	Ditto ditto	Panipat
Ditto	Khaja Safdar Ali	Ditto ditto	Ditto
Ditto	Kazi Habibulla	Ditto ditto	Ditto
Ditto	Tara Chand	Ditto ditto	Ditto
Rohtak	Bahadur Khan	Ditto ditto	Rohtak
Ditto	Turreh Bag Khan	Ditto ditto	Ditto
Ditto	Zafir Ali	Ditto ditto	Ditto
Ditto	Baldeo Sahai	Ditto ditto	Gohána
Ditto	Paim Raj	Ditto ditto	Ditto
Ditto	Dalmír Khan	Ditto ditto	Ditto
Ditto	Niringin Dás	Ditto ditto	Ditto
Ditto	Gházi Rám	Municipal Moharrir	Rohtak
Umballa	Jiwan Singh	Chowdri	Umballa
Ditto	Pír Bakhsh	Member of Municipal Committee	Ditto
Ludhiána	Ghulam Muhammad Khan	Ditto ditto	Ludhiána
Kángra	Mya Mull	Ditto ditto	Nurpur
Ditto	Lakha Mull	Ditto ditto	Ditto
Amritsar	Sheikh Khyrudin	Ditto ditto	Ditto
Ditto	Lalla Kurm Chand	Ditto ditto	Ditto
Ditto	Lalla Fakir Chand	Ditto ditto	Ditto
Gujránwála	Muhamet Ghúr Pershad (Guddi Nushim of the Dharmsála.)	Ditto ditto	Shekopura.
Rawalpindi	Bishen Singh	Tahsíldár	Rawalpindi
Ditto	Lalla Bhawani Dás	Assistant Surgeon	Ditto
Ditto	Niringin Dás	Member of Municipal Committee	Ditto
Ditto	Hari Rám	Ditto ditto	Ditto
Ditto	Warris Khan	Chowdri	Ditto
Jhelum	Hukm Chand	Member of Municipal Committee	Jhelum
Ditto	Karm Bakhsh	Ditto ditto	Ditto
Ditto	Muhammad Bakhsh	Ditto ditto	Ditto
Ditto	Murad Bakhsh	Ditto ditto	Ditto
Ditto	Bakhsha	Ditto ditto	Ditto
Ditto	Bohawal Bakhsh	Ditto ditto	Ditto
Ditto	Nowsherwanji	Ditto ditto	Ditto
Ditto	Bishen Singh	Ditto ditto	Ditto
Ditto	Karin Singh	Ditto ditto	Ditto
Ditto	Fakir Chand	Ditto ditto	Ditto
Ditto	Gur Ditta Mull	Ditto ditto	Ditto
Ditto	Hira Nand	Ditto ditto	Ditto
Ditto	Damodar Shah	Ditto ditto	Ditto
Gujrat	Subadar-Major Samanda Shah	Ditto ditto	Gujrat
Ditto	Lachman Dás	Ditto ditto	Ditto
Ditto	Ami Chand	Ditto ditto	Jalalpur
Ditto	Moulah Dadh	Zaildár and Member of Municipal Committee.	Kunjah
Jhang	Assistant Surgeon Chetan Shah	Civil Surgeon	Jhang
Ditto	Lalla Kanshi Rám	Member of Municipal Committee	Ditto
Ditto	Mian Kadir Bakhsh	Ditto ditto	Ditto
Ditto	Rám Rakha	Native Doctor	Kot Isa Shah

Names of officials and non-officials in each district of the Province whose services in the cause of Vaccination and Sanitation have been brought to the notice of Government by SURGEON-MAJOR H. W. BELLEW, C.S.I., *Sanitary Commr., Punjab.*—contd.

District.	Name.	Occupation.	Place of residence.
Jhang	Mahar Nur	Member of Municipal Committee	Ahmadpur
Ditto	Mian Amír Dín	Ditto ditto	Chaniot.
Ditto	Kanhya Lal	Moharrir of the Municipal Committee	Ditto.
Ditto	Rám Ditta	Chowdri	Maghiana
Ditto	Gholám Mohayad-din	Member of Municipal Committee	Shorkot
Ditto	Gilani Shah	Ditto ditto	Ditto
Muzaffargarh	Rai Manohar Lal	Extra Assistant Commissioner	Ditto
Ditto	Mohan Lal	Tahsíldár	Sanawan
Ditto	Jiwan Singh	Náib-Tahsíldár	Ditto
Ditto	Narain Dás	Tahsíldár	Alipur
Ditto	Ghulam Nabbi	Lambardár	Mahmúd Kot
Ditto	Khan Muhammad	Ditto	Ditto
Ditto	Nur Muhammad	Ditto	Ditto
Ditto	Fatih Muhammad	Ditto	Sanawan
Ditto	Remal Dás	Ditto	Ditto
Ditto	Kishan Mul	Hindu resident	Mahmúd Kot
Ditto	Devi Das	Ditto	Ditto
Montgomery	Devi Ditta	Tahsíldár	Kot Kamalia
Dera Ismail Khan	Hak Nawáz Khan	Member of Municipal Committee	Dera Ismail Khan
Ditto	Gosain Het Nand Lal	Ditto ditto	Ditto
Ditto	Míran Bakhsh	Munsiff	Karor
Ditto	Hak Dad Khan	Member of Municipal Committee	Ditto
Ditto	Diwan Doulat Rai	Ditto ditto	Ditto
Ditto	Diwan Thariya Ram	Ditto ditto	Bhakkar
Peshávar	Muhammad Khan		
Ditto	Haji Malik Rahman		
Ditto	Lalla Ram Dás		
Ditto	Lalla Níringin Dás		
Ditto	Mian Nizam-úd-dín		
Ditto	Kazi Abdul Wadna		
Ditto	Lalla Bada Singh		
Ditto	Rai Lakpat Rai		

H. W. BELLEW, SURGEON-MAJOR,
Sanitary Commissioner, Punjab.

APPENDIX A.

LAWRENCE MILITARY ASYLUM, SANAWAR.

Lawrence Military Asylum, Sanáwar.

The health of this Asylum has been very favorable, not a single death having occurred in it during the year under review. The Civil Surgeon makes the following remarks in his Annual Sanitary Report: "The general health of the Asylum during the year was good, no disease being specially prevalent. A few sporadic cases of chicken-pox and of measles occurred in the early part of the year, and one case of scarlatina was admitted last May. Febricula furnished 43 admissions, and Bronchial catarrh 48. Such diseases may be expected in young and growing children, who are susceptible to these complaints and who readily expose themselves to climatic changes.

Skin affections also were pretty common, as is generally seen where a large number of children is congregated together; they present no feature of special interest.

Vaccination is maintained in the institution and there has been no small-pox."

With reference to the remarks of the Army Sanitary Commission in the concluding portion of para. 18 of its review on my Sanitary Report for 1878 (see quotation para. 4) regarding the sewers and drains of this Asylum, some explanation seems necessary inasmuch as there appears to be an apparent misapprehension as to what sewers and drains are in this country where the dry-earth system of sewerage is enforced. The sewers are meant for the waste water from lavatories, and scullery water from kitchens and the drains are for the surface drainage of storm waters; practically no sewage matters ever enter either of these channels, because all night soil and fœcal matters are removed under a special arrangement by hand labor.

LAWRENCE MEMORIAL ASYLUM, MURREE.

Lawrence Memorial Asylum, Murree.

In my Sanitary Inspection Report of the Hill Sanitarium of Murree, Appendix D, I have described the satisfactory state in which I found the Sanitary arrangements of that Institution. There is one point, however, which I have not alluded to in that Report, and which I desire here to mention. It is the absence of any separate provision for Hospital accommodation. Although hitherto no inconvenience has been experienced from the existing arrangement of having the Hospital wards under one and the same roof with the other departments of the Institution, I think it highly advisable that the Hospital wards should be quite distinct and separate from the other parts of the Institution, and would strongly recommend the construction of an Hospital building on an entirely detached site—a double storied house with separate wards for boys and girls. When this is provided the Institution will be complete in all its departments.

The general health of this institution has also been very good. No deaths have occurred in it during the year under review. The admissions into Hospital among the children will be seen from Tables A and B.

APPENDIX A.

LAWRENCE MILITARY ASYLUM AT SANAWAR.

A.—Table showing the SICKNESS and MORTALITY among the CHILDREN of the above ASYLUM during the year 1880.

Months.	*Average strength.*		*Average No. daily sick.*		*No. daily sick per cent. of strength.*		*No. of deaths.*		*Died per 1,000 of strength.*	
	Boys.	Girls.	Boys.	Girls.	Boys.	Girls.	Boys.	Girls.	Boys.	Girls.
January	217	165	23·38	9·06	10·77	5·49	...	...	...	...
February	218	164	17·72	8·82	8·13	5·38	...	...	...	...
March	238	172	17·54	12·67	7·37	7·37	...	...	...	...
April	239	177	23·26	13·16	9·73	7·43	...	...	...	...
May	240	173	23·45	8·70	9·77	5·03	...	...	...	...
June	239	171	12·33	7·20	5·16	4·21	...	...	...	...
July	238	171	12·16	6·19	5·11	3·62	...	...	...	...
August	237	170	11·03	10·74	4·65	6·32	...	...	...	...
September	234	169	12·70	14·13	5·43	8·36	...	...	...	...
October	232	171	9·83	10·12	4·24	5·92	...	...	...	...
November	226	163	13·50	11·80	5·97	7·24	...	...	...	...
December	221	165	11·00	11·25	4·98	6·82	...	...	...	...
For the year ...	231	169	15·66	10·32	6·78	6·11	...	...	...	...

DISTRIBUTION of CHILDREN according to AGE on 1st *July* 1880.

SEX.	2 and under 5 years.	5—10.	10—15.	15—20.	Total of all ages.	REMARKS.
Boys	10	88	125	15	238	
Girls	5	63	87	16	171	
Total ...	15	151	212	31	409	

B.—*TABLE showing the* CAUSES *of* ADMISSIONS *into* HOSPITAL *among the*

year

Causes of admissions.	Number in											
	January.		*February.*		*March.*		*April.*		*May.*		*June.*	
	Boys.	Girls.	Boys.	Girls.	Boys.	Girls.	Boys.	Girls.	Boys.	Girls.	Boys.	Girls.
Small-pox	...	...	...	...	...	...	...	...	...	...	...	...
Chicken-pox	...	...	...	...	2	...	3	...	...	...	...	...
Measles	4	...	...	...	1	...	2	6	1	..	...	...
Enteric fever	...	...	...	...	...	...	...	...	...	...	...	...
Simple continued fever	...	...	...	...	...	...	...	...	...	...	...	...
Intermittent and remittent fever ...	...	...	...	...	...	...	...	1	...	1	...	2
Malignant cholera	...	...	...	...	...	...	...	...	...	...	...	...
Diphtheria	...	...	...	...	...	...	...	...	...	...	...	...
Hooping-cough	...	...	...	...	...	...	...	...	...	...	...	...
Mumps	...	...	...	...	...	...	...	1	...	...	...	...
Acute rheumatism	...	...	...	...	...	...	...	...	...	...	...	...
Phthisis pulmonalis	...	...	...	...	...	...	...	...	...	...	...	...
Meningitis	...	...	...	...	...	...	...	...	...	...	...	...
Sun-stroke	...	...	...	...	...	...	...	...	...	...	...	...
Epilepsy	...	...	...	1	...	...	...	...	...	...	...	...
Conjunctivis	...	...	...	...	1	...	7	1	4	...	...	...
Valve disease of heart	...	...	...	...	...	...	...	...	...	...	...	...
Croup	...	...	1	...	1	...	...	...	...	...	...	...
Bronchitis	...	...	...	...	...	...	...	...	...	...	...	...
Pneumonia	...	...	...	...	...	...	...	...	...	...	...	...
Dysentery	...	...	...	...	1	...	1	...	2	...	...	...
Diarrhœa	1	...	1	...	...	...	...	3	2	2	1	...
Ulcer	...	...	...	...	...	...	2	1	2	...	...	...
Tinea favosa	5	2	1	...	2	5	...	...	4	...	...	2
Itch	...	...	...	...	...	...	...	...	...	...	...	...
Wounds and accidents	1	...	...	...	...	...	...	...	2	...	3	...
All other causes	10	6	11	8	23	12	23	10	17	4	17	7
Total ...	21	8	14	9	31	17	38	23	34	7	21	11

Admitted per cent. of the average

	9·67	4·85	6·42	5·49	13·02	9·88	15·90	12·99	14·17	4·05	8·79	6·43

CHILDREN of the LAWRENCE MILITARY ASYLUM, SANAWAR, during the
1880.

EACH MONTH.												*Total admissions during the year.*		*Admitted per cent. of strength.*		*Died per cent. of admissions.*	
July.		*August.*		*September.*		*October.*		*November.*		*December.*							
Boys.	Girls.	Boys.	Girls.	Boys.	Girls.	Boys.	Girls.	Boys.	Girls.	Boys.	Girls.	Boys.	Girls.	Boys.	Girls.	Boys.	Girls.
...	...	...	...	...	...	...	...	...	..	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	5	...	2·16	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	8	6	3·46	3·55	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	1	2	1	...	...	...	...	1	...	3	6	1·30	3·55	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	..	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	—	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	0·59	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	1	...	...	...	...	...	...	...	...	...	1	...	0·59	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	0·59	...	...
...	...	...	...	..	1	...	...	...	..	1	...	13	2	5·63	1·18	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	1	...	...	...	...	...	3	...	1·30	...	...	...
...	...	...	1	...	...	2	...	...	1	...	1	2	3	0·86	1·77	...	...
...	...	...	...	...	..	...	...	...	...	...	...	...	...	...	...	...	...
1	...	3	1	...	...	...	...	1	...	...	...	9	1	3·90	0·59	...	...
1	1	1	3	1	...	...	...	...	...	...	...	8	9	3·46	5·32	...	...
...	...	1	...	...	...	...	...	...	1	1	...	6	2	2·60	1·18	...	...
...	1	...	...	1	...	2	2	2	1	3	3	20	16	8·66	9·47	..	...
...	...	...	...	...	...	...	1	...	...	...	...	...	1	...	0·59	...	...
...	...	3	...	3	...	...	1	1	1	...	...	13	2	5·63	1·18	...	...
13	7	13	9	18	11	15	7	19	6	10	6	189	93	81·82	55·03	...	...
15	9	21	16	25	13	20	11	23	10	16	10	279	144				
strength in each month.																	
6·30	5·26	8·86	9·41	10·68	7·69	8·62	6·43	10·18	6·13	7·24	6·06	120·79	85·21				

LAWRENCE MEMORIAL ASYLUM AT MURREE.

A.—Table showing the SICKNESS and MORTALITY among the CHILDREN of the above ASYLUM during the year 1880.

MONTHS.	*Average strength.*		*Average number daily sick.*		*Number daily sick per cent. of strength.*		*Number of deaths.*	
	Boys.	Girls.	Boys.	Girls.	Boys.	Girls.	Boys.	Girls.
January ...	90	59	0·00	0·00	0·00	0·00	...	...
February ...	90	61	0·73	1·41	0·81	2·31	...	...
March ...	89	64	0·96	0·09	1·08	0·14	...	...
April ...	92	68	1·53	0·63	1·66	0·93	...	...
May ...	91	67	1·74	0·06	1·91	0·09	...	...
June ...	90	67	3·56	0·03	3·95	0·04	...	...
July ...	90	67	1·19	0·32	1·32	0·48	...	...
August ...	90	67	1·77	0·90	1·97	1·34	...	...
September ...	87	63	0·00	0·66	0·00	1·05	...	...
October ...	84	63	0·25	0·00	0·30	0·00	...	...
November ...	77	60	0·10	0·90	0·13	1·50	...	...
December ...	78	59	0·00	0·12	0·00	0·20	...	...
For the year ...	87	63	0·98	0·42	1·13	0·67	...	...

DISTRIBUTION of CHILDREN according to AGE on 1st July 1880.

Sex.	2 and under 5 years.	5—10.	10—15.	15—20.	Total of all ages.	REMARKS.
Boys ...	...	36	43	11	90	
Girls ...	...	20	41	6	67	
Total ...	...	56	84	17	157	

B.—TABLE showing the CAUSES of ADMISSIONS into HOSPITAL among the
year

Causes of admissions.	NUMBER IN											
	January.		*February.*		*March.*		*April.*		*May.*		*June.*	
	Boys.	Girls.	Boys.	Girls.	Boys.	Girls.	Boys.	Girls.	Boys.	Girls.	Boys.	Girls.
Small-pox	...	...	...	...	...	...	...	...	...	...	...	...
Chicken-pox	...	...	...	...	...	...	...	...	...	...	1	...
Measles	...	...	...	...	...	...	...	...	...	...	...	...
Enteric fever	...	...	...	...	...	...	...	...	...	...	...	...
Simple continued fever	...	...	...	...	...	...	...	...	...	...	...	...
Intermittent and remittent fever ...	...	...	2	1	...	...	...	...	1	...	...	...
Malignant cholera	...	...	...	...	...	...	...	...	...	...	...	...
Diphtheria	...	...	...	...	...	...	...	...	...	...	...	...
Hooping-cough	...	...	...	...	...	...	...	...	...	...	...	...
Mumps	...	...	...	...	...	...	...	...	...	...	...	...
Acute rheumatism	...	...	...	...	...	...	...	...	...	...	...	...
Phthisis pulmonalis	...	...	...	...	...	...	...	...	...	...	...	...
Meningitis	...	...	...	...	...	...	...	...	...	...	...	...
Sun-stroke	...	...	...	...	...	...	...	...	...	...	...	...
Epilepsy	...	...	...	...	...	...	...	...	...	...	...	...
Conjunctivis	...	...	...	...	...	...	...	...	...	...	...	...
Valve disease of heart	...	...	...	...	...	...	...	...	...	...	...	...
Croup	...	...	...	...	...	...	...	...	...	...	...	...
Bronchitis	...	...	...	1	...	...	...	...	...	...	1	...
Pneumonia	...	...	...	1	...	...	...	...	...	...		...
Dysentery	...	...	...	...	...	...	...	...	...	...	...	...
Diarrhœa	...	...	...	...	...	...	...	...	...	...	...	...
Ulcer	...	...	...	...	...	...	...	...	...	...	...	...
Tinea favosa	...	...	...	...	...	...	...	...	...	...	...	...
Itch	...	...	...	...	...	...	...	...	...	...	...	...
Wounds and accidents	...	...	...	...	...	...	...	...	...	...	...	...
All other causes	...	...	4	2	3	1	4	...	1	1	1	...
Total ...	...	...	6	5	3	1	4	...	2	1	3	...

Admitted per cent. of the

	0·00	0·00	6·67	8·20	3·37	1·56	4 35	0·00	2·20	1·49	3·33	0·00

CHILDREN of the LAWRENCE MEMORIAL ASYLUM at MURREE during the 1880.

EACH MONTH.												*Total admissions during the year.*		*Admitted per cent. of strength.*		*Died per cent. of admissions.*	
July.		*August.*		*September.*		*October.*		*November.*		*December.*							
Boys.	Girls.	Boys.	Girls.	Boys.	Girls.	Boys.	Girls.	Boys.	Girls.	Boys.	Girls.	Boys.	Girls.	Boys.	Girls.	Boys.	Girls.
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	1	...	1·15	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	1	...	...	...	...	1	...	...	...	4	2	4·60	3·17	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	1	...	...	...	...	...	...	...	...	...	1	...	1·59	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	1	1	1·15	1·59	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1·59	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1	2	...	...	...	...	1	...	...	2	...	1	15	9	17·24	14·28	...	...
1	2	...	2	...	...	1	...	1	2	...	1	21	14				
average Strength.																	
1·11	2·98	0·00	2·98	0·00	0·00	1·19	0·00	1·30	3·33	0·00	1·69	24·14	22·22				

APPENDIX B.

POLICE FORCE.

No· I.--TABLE showing the SICKNESS and MORTALITY among the POLICE FORCE serving in the PUNJAB during the year 1880, *and the prevalence of the principal diseases in each month of the year.*

MONTHS.	Average strength.	Average number daily sick.	Number daily sick per cent. of strength.	Number of deaths.	Died per 1,000 of strength.	CAUSE OF DEATHS IN HOSPITAL.															
						Small-pox.	Enteric fever.	Simple continued fever.	Intermittent and remittent fever.	Malignant cholera.	Phthisis pulmonalis.	Scurvy.	Apoplexy.	Heart disease.	Respiratory diseases.	Dysentery.	Diarrhœa.	Hepatitis.	Wounds and accidents.	All other causes.	Died out of hospital.
January ...	19,359	353·54	1·83	45		...	...	...	3	...	2	...	...	...	10	...	...	...	...	2	28
February ...	19,499	337·39	1·73	39		...	...	...	2	...	2	...	...	...	16	2	...	...	...	3	14
March ...	19,462	270·86	1·39	20		...	...	...	2	...	...	...	...	...	6	...	1	...	...	...	11
April ...	19,484	265·83	1·36	26		...	...	...	...	...	1	...	...	...	8	...	...	...	...	1	16
May ...	19,560	265·94	1·36	30		...	...	...	4	1	...	...	...	...	3	2	...	...	...	3	17
June ...	19,592	240·88	1·23	30		...	...	2	2	1	1	...	2	...	5	...	1	1	...	1	14
July ...	19,544	253·99	1·30	19		...	...	...	4	...	...	...	...	...	1	...	...	1	...	2	11
August ...	19,539	283·70	1·45	15		...	...	...	2	...	1	...	...	...	1	2	...	...	...	2	7
September ...	19,589	314·35	1·60	14		...	...	...	1	...	...	...	...	...	2	1	1	...	...	1	8
October ...	19,536	354·49	1·81	32		...	...	...	2	...	1	...	...	...	7	2	...	...	1	2	17
November ...	19,528	336·77	1·72	32		...	...	1	2	...	...	...	...	...	6	2	6	...	...	2	13
December ...	19,548	307·52	1·57	40		...	...	1	3	...	...	1	...	...	15	1	...	...	...	3	16
						...	...	4	27	2	8	1	2	...	80	12	9	1	½	22	172
						Died per 1,000 of the average strength.															
For the year 1880	19,521	298·77	1·53	342	17·52	...	...	1·59	...	0·10	0·41	0·05	0·10	...	4·10	0·61	0·46	0·10	0·05	1·13	8·81
For the year 1879	19,578	376·30	1·92	526	26·87	0·20	...	2·35	...	1·28	0·31	...	0·05	0·15	6·13	0·92	0·77	0·05	0·10	1·38	13·18

Causes of Admission.	Number of admissions into Hospital in each month.												Total admissions during the year.	Admitted per cent. of strength.	Died per cent. of admissions.
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.			
Small-pox	...	...	1	...	...	...	...	...	1	...	1	...	3	0·01	...
Enteric fever	...	...	4	...	...	...	1	...	...	...	...	...	5		
Simple continued fever	3	6	6	5	13	16	12	9	5	10	18	7	110	17·11	0·93
Intermittent and remittent fever ...	202	177	162	213	184	198	239	394	446	439	353	218	3,225		
Malignant cholera	...	...	...	...	1	1	...	...	...	...	...	2	4	0·02	50·00
Rheumatism	29	18	27	23	32	22	28	19	22	25	20	27	292	1·49	...
Primary Syphilis—															
Hard chancre (indurated bubo) ...	12	13	12	19	5	19	19	18	9	10	10	8	154	0·79	...
Soft chancre (suppurating bubo) ...	7	13	9	13	15	14	10	17	5	19	12	8	142	0·73	...
Secondary syphilis	2	1	1	4	1	3	4	3	5	4	1	3	32	0·16	...
Phthisis pulmonalis	2	3	2	1	1	3	3	2	2	1	1	2	23	0·12	34·78
Scurvy	1	3	...	1	...	...	...	2	2	3	2	...	14	0·07	7·14
Apoplexy	...	...	...	...	...	5	...	...	...	...	...	...	5	0·02	40·00
Eye diseases	5	5	13	17	25	20	18	34	24	18	19	8	206	1·05	...
Respiratory diseases	124	95	72	45	20	12	20	13	24	39	67	99	630	3·23	12·70
Dysentery	22	11	9	30	25	23	27	36	51	56	43	45	378	1·94	3·17
Diarrhœa	9	9	9	15	10	6	12	10	13	20	17	6	136	0·70	6·62
Tænia	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Hepatitis	3	1	1	2	2	3	...	...	3	...	...	...	15	0·08	13·33
Gonorrhœa	4	7	10	10	8	9	15	8	4	6	5	6	92	0·47	...
Guinea-worm	...	...	...	...	...	8	16	7	4	2	1	...	38	0·19	...
Abscess and ulcer	54	46	42	46	45	62	67	65	55	57	59	53	651	3·33	...
Wounds and accidents	11	21	13	19	21	10	17	17	3	14	16	5	167	0·85	0·60
All other causes	66	69	96	89	85	64	96	88	73	73	68	75	942	4·82	2·33
	556	498	489	552	493	498	604	742	751	796	713	572	7,264	37·21	
	Admitted per cent. of the average strength in each month.														
For the year 1880 ...	2·85	2·55	2·50	2·83	2·52	2·55	3·09	3·80	3·85	4·08	3·65	2·93	37·21		
For the year 1879 ...	3·19	2·68	2·77	2·97	3·55	3·20	4·21	4·77	7·66	7·14	5·30	3·37	50·84		

No. II.—TABLE showing the SICKNESS and MORTALITY among the Police Force

Number.	DISTRICTS.	Average strength.	Number of admissions.	Admissions per cent. of strength.	Average number of daily sick.	Number daily sick per cent. of strength.	Number of deaths.	Died per 1,000 of strength.
1	Delhi ...	1,166	685	58·75	32·05	2·75	33	28·30
2	Gurgaon ...	493	131	26·57	6·69	1·36	2	4·06
3	Karnál ...	598	209	34·95	9·84	1·64	20	33·44
4	Hissar ...	536	168	31·34	7·45	1·39	11	20·52
5	Rohtak ...	451	225	49·89	6·22	1·39	10	22·17
6	Sirsa ...	367	107	29·15	4·92	1·34	3	8·17
7	Umballa ...	1,154	339	29·38	11·71	1·01	25	21·66
8	Ludhiána ...	551	312	56·62	7·98	1·45	6	10·89
9	Simla ...	206	45	21·84	1·41	0·68	2	9·71
10	Jullundur ...	512	118	23·05	8·01	1·56	6	11·72
11	Hoshiárpur ...	499	196	39·28	9·32	1·87	11	22·04
12	Kángra ...	411	171	41·60	0·45	0·11	14	34·06
13	Amritsar ...	923	403	43·66	18·53	2·01	12	13·00
14	Gurdáspur ...	573	210	36·65	6·96	1·21	15	26·18
15	Siálkot ...	540	108	20·00	6·20	1·15	4	7·41
16	Lahore ...	1,363	540	39·62	27·53	2·02	42	3·08
17	Gujránwála ...	475	111	23·37	8·59	1·81	1	2·10
18	Ferozepore ...	558	222	39·78	10·09	1·81	8	14·34
19	Rawalpindi ...	1,126	437	38·81	15·69	1·39	26	23·09
20	Jhelum ...	535	278	51·96	12·43	2·32	11	20·56
21	Gujrat ...	365	103	28·22	3·92	1·09	2	5·48
22	Shahpur ...	468	108	23·08	3·12	0·66	1	2·14
23	Mooltan ...	836	187	22·37	10·83	1·29	5	5·98
24	Jhang ...	491	100	20·37	5·51	1·12	1	2·04
25	Montgomery ...	479	168	35·07	4·88	1·02	1	2·09
26	Muzaffargarh ...	373	278	74·53	9·84	2·63	11	29·49
27	Dera Ismail Khan ...	582	162	27·83	4·18	0·72	13	22·34
28	Dera Gházi Khan ...	491	126	25·66	4·82	0·98	4	8·15
29	Bannu ...	464	175	37·71	5·99	1·15	3	6·46
30	Pesháwar ...	1,090	409	37·52	16·06	1·47	30	27·52
31	Hazára ...	431	177	41·07	7·04	1·63	5	11·60
32	Kohát ...	414	256	61·83	10·51	2·54	4	9·66
	TOTAL ...	19,521	7,264	37·21	298·77	1·53	342	17·52

serving in each District of the Punjab during the year 1880.

CAUSES OF DEATHS IN HOSPITAL.																
Small-pox.	Enteric fever.	Simple continued fever.	Intermittent and remittent fevers.	Malignant cholera.	Phthisis pulmonalis.	Scurvy.	Apoplexy.	Heart diseases.	Respiratory diseases.	Dysentery.	Diarrhœa.	Hepatitis.	Wounds and accidents.	All other causes.	Died out of Hospital.	Number.
...	...	...	4	2	2	...	...	...	12	2	...	...	...	...	11	1
...	...	...	1	...	...	...	...	...	1	...	...	...	...	...	...	2
...	...	...	1	...	...	...	...	...	2	1	...	...	...	2	14	3
...	...	...	...	...	1	...	1	...	2	...	...	...	...	...	7	4
...	...	...	...	...	2	...	1	...	...	...	...	...	...	4	3	5
...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	2	6
...	...	...	1	...	...	...	...	...	5	...	...	...	...	...	19	7
...	...	...	2	...	...	...	...	...	3	...	...	...	...	1	...	8
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	9
...	...	...	1	...	...	...	...	...	3	...	...	...	...	2	...	10
...	...	...	...	...	...	...	...	...	1	...	...	...	...	1	9	11
...	...	...	5	...	...	...	...	...	...	1	...	...	...	...	8	12
...	...	...	4	...	...	...	...	...	4	...	4	...	...	...	...	13
...	...	2	...	...	1	...	...	...	2	...	...	...	...	2	8	14
...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	3	15
...	...	...	...	...	...	...	...	...	18	2	2	1	...	1	18	16
...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	17
...	...	...	1	...	...	...	...	...	2	1	...	...	...	2	2	18
...	...	...	2	...	1	...	...	...	4	1	1	...	...	1	16	19
...	...	...	4	...	...	...	...	...	3	...	...	...	...	...	4	20
...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	1	21
...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	22
...	...	...	...	...	...	...	...	...	4	..	...	...	...	1	...	23
...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	24
...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	25
...	...	...	...	...	1	...	...	...	2	...	...	...	...	2	6	26
...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	12	27
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4	28
...	...	...	...	...	...	1	...	...	...	...	...	...	1	1	...	29
...	...	2	...	...	...	...	...	...	5	2	1	1	...	...	19	30
...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	4	31
...	...	...	...	...	...	...	...	...	4	...	...	...	...	...	...	32
...	...	4	27	2	8	1	2	...	80	12	9	2	1	22	172	

APPENDIX C.

REPORT ON THE INSANITARY CONDITION OF KALKA.*

Copy of No. 4118 *B, dated the 7th October* 1880, *from the Quarter Master General in India, to the Secretary to Government Punjab, Military Department.*

In continuation of this office No. 794 B, dated 5th April 1880, the undersigned is instructed by His Excellency the Commander-in-Chief to forward, for the information of His Honor the Lieutenant Governor, the documents marginally noted, with a recommendation that the Sanitary Commissioner may be directed to inspect and report on the town, and that such remedial steps may be taken as may be considered necessary to improve its sanitary conditions.

Copy of a letter No. 3117, *dated 29th September* 1880, *from the General Commanding the Sirhind Division of the Army, to the Quarter Master General of the Army in India.*

With reference to this office No. 175 of the 15th January 1880, that part of it relating to the insanitary condition of Kalka, I have the honor to inform you that I have recently received a report from the Officer acting as Civil Surgeon of Kasauli and its neighbourhood (a copy of which is attached), in which he again draws attention to the state of things existing in Kalka.

2. On the 15th January 1880 and the 15th March 1880, I drew the attention of the Commissioner of Umballa to this subject and certain steps were taken to improve matters.

3. It is, however, clear, that from these measures, satisfactory results have not ensued. Dirt still reigns supreme at Kalka, while the practice of prostitution results in many British soldiers falling victims to venereal disease.

4. I have again addressed the Commissioner of the Umballa Division on this subject, and suggested remedial measures, similar to those contained in my letter under reference.

The subject, however, is one of so great importance, that I bring it again before His Excellency the Commander-in-Chief, trusting that he will, should he consider it advisable, bring the matter of the proper sanitation of Kalka, and also the introduction of measures to restrain prostitution, or to mitigate its effects, to the notice of the Government of India. While giving the Civil Authorities full credit for a desire to put an end to a pernicious state of things which affects such large numbers, not only of British soldiers, but of the higher official classes, I think it is doubtful whether any real improvement can take place if the question is dealt with only locally.

Copy of a letter No. 446, *dated the* 24*th September* 1880, *from the Surgeon Major, in Medical Charge, Kasauli Hill Depôt, to the Officer Commanding, Kasauli.*

I have the honor to submit copy of a report made to me as Civil Surgeon of this station by the Hospital Assistant of the Civil Dispensary at Kasauli, of the prevalence of diarrhœa and ague at Kalka.

2. I have brought to your notice, time after time, the vile condition of that hamlet : generally it is filthy to a degree, and its sanitary condition is that most favorable to the spread of such diseases as originate in human intercourse and want of cleanliness.

3. I am of opinion that several cases of enteric fever, which occurred in this cantonment last year, originated in Kalka. The epidemic of cholera in April and May 1879, which occurred among natives at this station, was of a limited character. The history of every individual case was therefore easily traced and there is not a link in the chain of evidence wanting. In every instance the disease was imported from Kalka or the adjacent village of Pinjore.

4. This question is one of urgent importance affecting a large section of the European residents of this and neighbouring hill stations, and it also affects the health of a large number of troops. I have the honor, therefore, to request you will be pleased to bring the question to the notice of the Lieutenant-General Commanding the Sirhind Division, and in doing so, I beg to observe that without proper latrine accommodations and without European supervision daily, no lasting improvement can be expected.

Copy of a letter dated 22nd September 1880, *from* Sewa Singh, *Hospital Assistant, to the Civil Surgeon, Kasauli.*

I humbly beg to report that on the 18th September 1880 I went to Kalka to attend the patients suffering with fever and diarrhœa. I saw that a majority of people at Kalka were suffering with the above diseases. 80 cases of fever and 55 of diarrhœa were attended to at the time, besides many other cases such as dropsy, &c. I beg to lay the above for your information. The patient of dropsy has been brought to Kasauli Dispensary for treatment.

---

* Station situated at the foot of the hills on the line of the Trunk road from Umballa to Simla.

Copy of a letter No. 3069, *dated* 23*rd October* 1880, *from Secretary to Government, Punjab, to the Quarter Master General in India.*

With reference to your No. 4118 B, dated 7th instant, to the address of the Secretary to this Government in the Military Department, I am desired to forward for information, a copy of the correspondence with the Commissioner Umballa, from which it will be seen that measures are under consideration for improving the sanitary condition of Kalka. The Commissioner has been asked to report what arrangement is proposed with reference to the remarks in this office No. 333 of the 21st ultimo.

No. 3071, *dated Lahore, the* 23*rd October* 1880.

Copy of the foregoing forwarded to the Sanitary Commissioner, Punjab, for information and for report as suggested by the Quarter Master General.

By order, &c.,
(Sd.) R. H. HAVILAND,
for *Secretary to Government, Punjab.*

Copy of a letter No. 3922, *dated* 11*th November* 1880, *from Surgeon Major* H. W. Bellew, c. s. i., *Sanitary Commissioner, Punjab, to* W. M. Young, Esquire, *Secretary to Government, Punjab.*

In compliance with your endorsement No. 3071 of 23rd ultimo, and accompanying copies of correspondence which reached this office on the 29th idem, I have the honor to submit herewith my report and recommendations relating to the sanitary condition of Kalka.

2. I proceeded from this to Kalka on the 2nd instant, and during the 3rd, 4th, and forenoon of the 5th idem, made a thorough inspection of the sanitary condition of the locality with the results and recommendations I now proceed to describe.

General description.

3. The Settlement of Kalka has grown up within the last fifty years as a staging station about and around the small native village of Karári, situated at the foot of the hills on the line of the trunk road from Umballa to Simla. Its population, according to the census of 1868, was 2,816. The number of its houses is now roughly estimated at about 700, inclusive of 4 public saráis and 4 European hotels.

The station extends for nearly a full mile along each side of the trunk road below the point where that road leaving the open country enters the hills at the gap formed by the ravine of the Sukna Nalah, across which the trunk road passes by a good masonry bridge, a short distance above the station.

Sukna Nalah.

4. In the rocky channel of the Sukna Nalah flows a small perennial stream called Jhájara Naddi. It is fed from some springs in the bed of the ravine above the bridge, and passing immediately to the east side of the station, joins the Ghaggar stream below Pinjore, which is situated also on the line of the trunk road about 3 miles lower down than Kalka. This Jhájara rivulet is the principal source of water supply for Kalka. Its stream works six water mills along the course of the ravine, 2 being above the bridge and 4 below it, and is also diverted in regular alternation into two water cuts, one of which flows through Kalka on the west side of its natural channel, and the other through cultivation and small clusters of native huts in Patiala territory on the east side of that channel.

Area and extent of Kalka.

5. The area of the Kalka station is defined by boundary marks which separate the British territory from that of the surrounding Patiala State. On the east side this boundary is formed by the natural course of the Jhájara rivulet, and on the west side by the pillars of the military camp-ground in the direction of the road to Nalagarh. Roughly, I should say, the area of the station is about a mile each way from north to south, and from east to west. In the latter direction the most part of the area is formed by the military camp-ground.

It will thus be seen that the station of Kalka occupies an open site on the slope of the hill skirt, where the trunk road from Umballa enters the hills on its way to Simla. The settlement itself extends along each side of the trunk road for about a mile and terminates northwards on the slope of a terminal spur, which forms the west side of the Sukna Nalah gap before mentioned, and is traversed by the old road to Simla by way of Kasauli. It consists therefore of two lines of European bungalows and hotels, and native saráis and shops fronting the trunk road up to the police station, bazárs and native quarters situated transversely at the foot of the spur, where it gives off the branch road to Kasauli, and winds round to the Sukna Nalah gap.

Its eastern side how occupied.

6. Behind the line on the right hand or east side are several clusters of native huts, and some narrow strips of rice and ginger cultivation which drops in terraced fields to the bank of the Sukna Nalah, where, at the lowest part of the station are a public latrine, and a site for shooting rubbish into the channel of the Nalah. This eastern portion of the station is traversed by the water-cut before mentioned. It is drawn from the Jhájara stream some way below the bridge, and feeds a masonry tank in rear of the Commissariat cattle yard, and then passes into a dirty little duck pond in rear of the Moola sarái, where it divides into two channels, one of which goes straight on in rear of Lowrie's Hotel and the Post Office compound to the cultivation beyond, and the other of which turns off between Lowrie's Hotel and Moola sarái, and crossing under the trunk road through a covered masonry channel, flows in an open ditch on its further side below Jethu's Horse Dák Office, whence it is diverted in a succession of cuts for the irrigation, in regular alternation, of the cultivation below Mr. Tuther's compound.

Its western side.

7. Behind the line on the left hand or west side are some cultivated fields, a public latrine, and the military camp-ground, with, between this last and the trunk road, the native huts of Karári, the prostitutes' *chakla*, (quarter) and the Commissariat quarters and godowns. There is no water in this portion of the station above the point where the irrigation cut enters as before mentioned.

At the top of the station these two lines are joined by the transverse arrangement of the police station, Purána bazár, and Bhanjara quarter which occupy the base and slopes of the terminal spur before mentioned, and which are traversed by two parallel streets which lie crossways to the Simla trunk road and Kasauli road, and conduct from them to the military camp-ground. There is no water in this portion of the station except in the Báoli at the side of the trunk road beyond the Purána bazár.

Such, in brief terms, is the general disposition of the Kalka station. I now proceed to describe in detail the results of my inspection.

Situation and names of buildings, &c., on the right hand of the road.

8. On the right hand of the road entering the station from the south are in succession Johnson's Dák Bungalow, the Government Post Office and Van Agency, Alla Bakhsh sarái, Lowrie's Hotel, Moola sarái, and native *paráo*, or camp-ground.

Johnson's Dák Bungalow.

Of these, Johnson's Dák Bungalow is situated in a neglected compound at the back of which flows the irrigation stream before mentioned. The bungalow used as an hotel is badly found and in worse order. The conservancy of the ground in its rear is neglected, ashes, stable litter, and sweepings being shot anywhere on the surface.

Government Post Office

The Government Post Office and Van Agency compound, with its sheds and workshops, I found in good order and fairly well kept. But the masonry reservoir near the workshops, which is fed from the water-cut in rear of the compound, was in a very dirty condition, and the ground round it miry from spillings. It had evidently not been cleaned out for a long time.

Alla Bakhsh Sarái.

The Alla Bakhsh sarái contains 14 huts for private families ranged somewhat irregularly along the sides of the square enclosure. The yard at the time of my visit was encumbered with several heaps of stone for building purposes, and cattle were tethered in it. The ground was kept well swept, the litter and sweepings being regularly burnt in heaps at different spots. The ashes, however, were not regularly removed, and I found several considerable masses which had become trodden and scattered under the feet of passers to and fro. In the south-east corner of the sarái is a mosque with a lavatory attached. The waste conduit of this was in bad repair, and spilled water formed miry puddles about the water jars. The conduit should be repaired so as to allow of a free drain to the ground outside in rear.

Lowrie's Hotel.

The compound of Lowrie's Hotel is kept in fairly good order; all sweepings, kitchen garbage, house refuse, and stable litter being daily removed to the dung heap on the bank of Sukna Nalah near the public latrine. The water-cut and duck-pond before mentioned are situated outside the north-east corner of this compound. One of the branches from it flows along the east side or rear of the compound, and the other along its north side in rear of the kitchen, at the side of which it enters the compound in front of the hotel, and passing out at the entrance gateway crosses the trunk road as before described. Both these water-courses and the duck-pond were in a very dirty condition, and lined with a thick sediment of blackish sludge. All require thorough cleaning out and proper trimming of the banks.

Moola Sarái.

The Moola sarái contains about 38 huts. I found the yard remarkably well kept and free from filth and litter. The water cut from the *Kol* (stream) at the duck-pond passes along the south side of the yard till it enters the compound of Lowrie's hotel. It is a dirty little channel no ways protected from the rubbish and litter about its edges.

Native Camp-ground.

The *Paráo* or native camp-ground is a large open space fronting the trunk road, and situated between the Moola and Patiala saráis. In its rear is a row of native huts occupied by cow-keepers and stable men. The scavenging of this ground is done by 4 Government sweepers who are supervised by the Police Officer here. I found the ground fairly well kept though crowded with carts and cattle at the time of my visit. The sweepings are removed daily to the dung heap on the bank of the Sukna Nalah. Behind the huts of this camp-ground are some fields of sugar-cane, ginger, and arum (*arabi*), and in the bed of the ravine below is a cluster of thatched huts occupied by swineherds.

Beyond the *Paráo* continuing along the trunk road are, in succession, the Patiala sarái, the Government Commissariat cattle yard and sheds, the Shekh Husen sarái and Mahesha Mal's bungalow, and then come the cross streets of the upper part of the station, and beyond them the Sherdahan Báoli and the trunk road to Simla over the Sukna Nalah bridge.

Patiala Sarái.

Of these, the Patiala sarái contains a masonry bungalow raised on a plinth in its yard, with row of huts along its enclosing sides. I found the area of the yard in a very untidy and unswept condition. The cattle litter had been fired in small heaps at different spots, and these were smouldering at the time of my visit. In front of the rear row of huts the ground was covered with a great mass of ashes, which were trodden under foot and scattered by the traffic to and fro. The sarái I am informed has been let on contract for 10 years at Rs. 500 a year to one Shankar, Banniah, and I was told that these ashes had been so collected here by his orders to raise the level of the ground at that spot so as to give a free drainage to storm waters along the front of this row of huts. This excuse, however, did not account for the otherwise unswept condition of the yard.

Government Commissariat cattle yard.

The Government Commissariat cattle yard and godown sheds which occupy the next enclosure, contained at the time of my visit, 351 head of horned cattle. The yard was in good order and well kept, the litter being removed daily by the Commissariat graziers to the dung heap on the Sukna Nalah and there fired.

Shekh Husen Sarái.

The Shekh Husen sarái contains 40 thatched huts ranged along the sides of the enclosure. The yard was fairly well kept, though the litter was habitually burnt in the yard and the ashes left on the spot. The ashes should be removed periodically to the dung heaps outside.

Mahesha Mal's bungalow.

Mahesha Mal's bungalow is in course of construction on the site of a former house occupied by Mr. Law. It stands well back in a spacious compound and is shaded by a fine *pipal* tree.

Beyond this, the trunk road turns to the right and forms the first of the two transverse streets at the top of the station; the other running parallel to it through the Purána bazár and connecting the trunk road to Simla with the road to Kasauli. It is flanked on either side by native shops and huts and contains the Alla Bakhsh mosque.

Sherdahan Báoli or reservoir.

Beyond the rows of huts the road passes along the edge of the Sukna Nalah to the bridge across it, running for this short distance at the foot of a spur which ends here in an abrupt bluff. At the foot of this bluff bank at the side of the high road, and a few yards beyond the last huts of the station is the Sherdahan Báoli, the Lion's mouth reservoir.

This reservoir is the only source of the drinking water for the whole station. It is a pyramidal shaped cistern 13 feet square at the top, the several sides converging to a point at the bottom which is 5½ feet deep. The reservoir is fed from a spring at the foot of the cliff and the water as it issues is passed into the cistern through a stone spout cut in the shape of a lion's head and hence the name of the Báoli. The reservoir is sunk in a masonry chamber 2 feet deep into which water drawers descend by 2 steps, and draw from the open cistern, the surface of which is flush with the floor of this sunk chamber. At the time of my visit there were five persons, men and women, drawing water at once. Some were barefooted and others wore their shoes, and from all the drippings flowed back into the cistern. To look at, the water was clear, but the cistern was covered with aquatic vegetation and slime. On the side of the reservoir next to the road is a deep masonry drain for the conveyance of overflow. It conducts under the trunk road across to the Sakna Nalah where, under the retaining wall of the road and at a short distance above the Debi Mandir and adjoining water-mill, it forms two shallow pools of irregular shape and quite unprotected. From these pools the lower castes of the people draw their drinking water, as they are proscribed from drawing at the Báoli itself. At the time of my visit two poor women were filling their water jars here at the same time that 3 or 4 mules were drinking with their forefeet planted in the pools.

Water-supply.

9. The Báoli above the road and these two pools below it—all fed from the same spring—are the only sources of drinking water for the whole of the Kalka station. The stream of the Jhájara rivulet which flows close below these pools is only used for watering cattle, as the stream, before being led off into irrigation cuts a little lower down, is frequented by washermen, bathers and swine which wallow in its bed. Both these sources of water-supply, the Báoli and the pools, are entirely unprotected from ordinary causes of pollution, and though they are supposed to contain good water there can be no doubt that it is more or less seriously contaminated before presented for consumption.

It appeared to me that the supply of water from these sources was insufficient for the requirements of the population of the station, but the Deputy Inspector of Police, Rangi Láll, who accompanied me in my tours of inspection, assured me that there was no complaint on that score, for however much was drawn from the Báoli, its cistern always remained full. There is no doubt, however, that many of the poorer classes draw their water from the irrigation stream which flows through the eastern and lower part of the western sides of the station, rather than take the trouble of going to the Báoli itself. This stream is taken off from the bed of the Jhájara rivulet a little below the Debi Mandir and passing along the rear of this eastern side of the station in an open and irregular water cut, feeds a masonry reservoir in rear of the commissariat cattle yard, and then proceeds as before described to the lower parts of the station.

This reservoir or tank is a good stone masonry structure 80 feet long by 63 feet broad, and 6½ feet deep, and it has a watering trough for cattle on the side facing the roadway on the east. I found the water in it in a very foul state, and it had evidently not been cleaned out for a very long time.

This completes my inspection of the right hand or east side of the Station.

Its western side how occupied.

10. On the left hand of the road entering the station from the south are, in succession, some native huts opposite Johnson's Dák Bungalow, then Mr. Tuther's compound, Jethu's Horse Dak Agency, Lumley's Hotel, Johnson's Hotel, Commissariat Bungalow and Godowns, McBarnett's Sarái and the Police Station, all of which front the trunk road. In rear of these, in the same order of succession, are some cultivated fields, a public latrine, the sheep shambles, the Karári village and prostitutes' *chakla*, the commissariat quarters and godowns, and European graveyard, McBarnett's hotel with the Military camp-ground extending all along beyond them.

Of these the native huts and Tuther's bungalow adjoining are the only parts of this portion of the station in which there is any water, and that is derived from the irrigation stream before mentioned as crossing the trunk road from Lowrie's Hotel.

Jethu's Horse Dák Agency.

Jethu's Horse Dák Agency is a small square enclosure which I found in good order and well kept.

Lumley's Hotel.

The compound of Lumley's Hotel adjoins it; this I found in remarkably good order. There is a latrine for servants in the south-west corner of the compound and near it a large conical pit for refuse and sweepings. This when filled is covered over with a thick layer of earth and another dug alongside, as I was informed.

Adjoining is Johnson's Hotel, now little used, and in rear of both are the sheep shambles, Karári village, and *chakla* for prostitutes. The shambles are poor thatched huts close to some fields in which the goats and sheep are slaughtered. The Karári village consists of a number of huts ranged along the sides of a small open square space which was formerly occupied by a village pond, now filled in and forming the area of the square. The huts are occupied by potters, *dooly*-bearers and porters, and the surroundings are dirty and not well scavenged. In one corner of the square is a heap of ashes formed by a potter's kiln. The prostitutes' *chakla* is a small square enclosure in a bazár street connecting Karári with the trunk road. It contains 14 huts and at the time of my visit was occupied by 13 prostitutes. These women are under no supervision. There are besides 4 other prostitutes in different parts of the station. The Police Inspector, Rangi Lál, informed me that there was an unusual prevalence of gonorrhœa and syphilis in this station, but he thought these diseases were propagated more by the clandestine than the public prostitutes, as the latter were generally looked after by their Muhalladár. The former class he informed me was composed mostly of the hill women and those of Bhanjara, or mat-weaver caste; and these, he told me, were known to have dealings with the European soldiers at Kasauli, Dagshai and Subáthu.

A public latrine and 3 cultivated fields where the filth of this portion of the station is thrown.

In rear of all these are some cultivated fields and a public latrine, and beyond these again is the southern portion of the Military camp-ground. These fields are used as sites for shooting the rubbish and filth of all this portion of the station. I found the stuff scattered about over the surface of 3 fields in irregular heaps and quite wasted as manure. It should be all collected within a low walled enclosure and sold as manure or fired.

The public latrine is similar to that on the other side of the station. Both are stone built and on the same plan—that is a row of 8 compartments on each side of a longitudinal wall, all roofless, and enclosed within an outside wall of oblong form with a dry earth store at each end. I found both latrines in fair order and the seats dressed with straw and dry stable litter instead of dry earth. Each latrine contains 16 seats and is attended to by two sweepers, a male and female, at each. They are well situated and well served. I observed that the walls and seats in each required repair in several places. These should be made at once in order to avoid greater expense hereafter.

Above the prostitutes' *chakla* is the Commissariat bungalow, and across the road leading from the trunk road to the Military Camp is the European graveyard in a small enclosure on the open space of the Commissariat camel lines and store godowns. Above these again are McBarnett's Hotel and the Police Station.

Commissariat lines and McBarnett's Hotel.

The Commissariat lines were in good order and well kept, but McBarnett's Hotel, which is now used as a native sarái, was in a very dirty and neglected state. I found several shallow pits in the compound, all more or less full of litter and sweepings, and in different spots were heaps of stable litter smouldering into ashes. There is no attempt here at conservancy. The sweepings, litter, &c., should be collected at one spot and there fired or removed daily to the fields in rear of Lumley's Hotel where the rubbish of this part of the station is shot.

Police Station.

The Police Station is situated on the upper part of the settlement which lies transversely to the lower part just described. This upper part consists of 2 parallel streets which lie east and west and connect the Simla and Kasauli roads with the Military camp-ground. It comprises native shops and the huts of *dhobis* (washermen) and smiths and the Bhanjara quarter on the slope of the spur overlooking the camp-ground. There is no water in this part of the station, except in the Báoli before described. I found the streets remarkably clean and the huts fairly so.

Military camp-ground.

The Military camp-ground which extends along the whole of the rear of this west side of the station is a spacious open undulating slope with a hard stony surface. It is crossed in its upper part by the road to Nalagarh. South of this road and towards the centre of the camp-ground is a well of dressed stone. Its tube is 6 feet in diameter and at about 50 feet presents a dry bed of small stones apparently thrown in from the top. The well has been dry I was told for some 7 or 8 years, but formerly contained good water.

Between this well and the Commissariat camel lines or the avenue of trees in front of them, I found a large collection of rubbish and litter and some partially burned pack saddles of camels or elephants upon the surface of the camp-ground. I was told that the stuff had been cast here by the commissariat sweepers to save themselves the trouble of carrying it to the usual place further off. The stuff should be removed and its disposal of at this spot prohibited for the future. There is no water on the Military camp-ground.

Sanitary condition of Kalka not so filthy as to call for unreserved condemnation.

11. I have now described my inspection of the Kalka station. Taken as a whole it is by no means a filthy place, nor is its general sanitary condition so bad as to call for unreserved condemnation. There are, however, some special and important faults in its general sanitation which require special consideration and special remedy. These are its defective conservancy arrangements, and its very faulty provision for good water supply. Both evils are the result of the absence of a proper local authority to supervise and provide for these very important sanitary requisites; for Kalka is not a municipality, nor has it any local board of health.

Conservancy Establishment.

12. The conservancy of its public thoroughfares, bazárs, camp-ground, and latrines is at present provided for by the district authorities. The staff of sweepers so entertained consists only of 14 hands at Rs. 4 each a month distributed as follows:—

6 Sweepers for Bazárs and public roads;
4 ditto ,, Native camp-ground;
4 ditto ,, (including 2 women) for public latrines;

and they are placed under the supervision of the Deputy Inspector of Police of the station. For the rest the Commissariat establishments and private residents are left much to their own devices. As a rule these dispose effectually of their sweepings and refuse, either by removal daily to the manure sites appointed in rear of the inhabited quarters, or by firing upon their own premises. But there are many exceptions, and the want of a proper supervising official allows of neglect to pass unnoticed or unchecked.

I would recommend the increase of the sweeper establishment by 2 sweepers for the native quarters of Karári and Purána bazár, and of a Darogah at Rs. 10 a month for the supervision of the general conservancy of the whole station. His duty should be to supervise the paid establishment, and inspect the condition of all parts of the station, seeing that refuse, litter, and ashes are periodically removed from the private premises to the manure sites outside. These sites I would have enclosed within low walls, and the manure collected in them might be sold for the benefit of the District Fund.

Suggestion for the opening out of a branch Dispensary here.

13. From enquiries made on the spot, I am inclined to believe that the imposition of octroi dues here, for the sanitation of the station, and establishment of a small Dispensary in it, would be willingly accepted by the residents, and that even a moderate house tax would not be objected to. What amount of income would be derived from either of these sources I have no sufficient data to guide me, but I think a minimum of Rs. 100 a month might be easily realized. At present the only medical aid attainable in the station is from a native Hakím. On the morning of the 5th instant I was informed that the list of his patients comprised 3 cases of diarrhœa, 15 of syphilis (8 males and 7 females), 20 of gonorrhœa (16 males and 4 females), 1 of bubo, 8 of intermittent fever, and a few others of chronic diseases.

The death and birth rate of Kalka.

14. The death register of the police station up to 30th October shewed a total of 103 deaths including 15 from "fever and diarrhœa" (probably enteric fever) or simple diarrhœa, which is at the rate of 44 per mille per annum. The birth register up to the end of the same month shewed a total of only 40 births, which gives a rate of only 17 per mille per annum. The death rate is as abnormally high as the birth rate is abnormally low.

15. The prevalence of venereal affections is very marked and calls for some special remedial measures. From what I heard in the station it appears to me probable that some of the public prostitutes here are diseased women who have been expelled from the cantonments of Umballa and Kasauli ; though doubtless the clandestine prostitutes are also largely diseased.

Were a branch Dispensary established here, these women of both classes could be brought under some control and medical supervision, and on these grounds alone I would strongly recommend the establishment of such an institution here in reference to para. 3 of No. 3117 of 29th September 1880, from the General Commanding the Sirhind Division of the Army to the Quarter Master General of the Army in India.

Probable causes of high mortality.

16. With reference to the high rate of mortality registered at this station, I am unable to assign any special cause. I heard on the spot that the health of the place has been popularly believed to have deteriorated ever since three elephants died here about three years ago, but what the precise cause was nobody could say, some attributing it to an altered air and others to the fouled water of the Jhájara rivulet. Probably both exercise their special influences in the production of disease and death.

I subjoin herewith a tabular statement of deaths registered here by months for the years 1875 to 1880, up to end of October. From this it will be seen that the popular belief in the deteriorated salubrity of the place is not without reason. But I must note that the increased mortality here during 1878 and 1879 is not exceptional, but was shared in by the whole province generally, as explained in my Sanitary Administration Report for those years. The continuance, however, of this high rate of mortality at Kalka during the current year whilst the death rate of the province as a whole has very sensibly declined is a point calling for special notice.

Deaths registered in the Kalka Police Station during each month of the year from 1875 *to* 1880, *inclusive—Population* 2,816.

YEARS.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.	Death-rate.
1875	4	7	5	5	7	9	10	8	8	3	3	9	78	28
1876	4	6	7	6	12	11	7	10	11	9	6	10	99	35
1877	11	8	2	8	6	9	4	5	8	6	9	6	82	29
1878	8	10	5	8	10	9	6	11	17	11	8	10	113	40
1879	9	12	6	14	7	11	13	7	21	37	21	16	184	65
1880	10	7	16	9	18	10	7	8	9	20	...	...	...	...

Fevers and bowel complaints, the principal death causes.

17. From the following statement, shewing the mortality from different diseases for the years 1875 to the end of September 1880, it will be seen that the principal death causes operating at Kalka are fevers and bowel complaints.

Deaths registered in the Kalka Police Station from the year 1875 *to* 1880—*Population* 2,816.

DISEASE.	1875.	1876.	1877.	1878.	1879.	1880.	REMARKS.
Cholera	3	...	...	...	14	1	
Small-pox	...	...	...	1	2	...	
Fevers	48	50	49	71	101	42	
Bowel complaints	7	13	5	17	29	14	
All other causes	20	36	28	24	38	27	
Total	78	99	82	113	184	* 84	* So far as Sept. 1880.
Death-rate... ...	28	35	29	40	65	38	

Provision for a wholesome and safe water-supply of first importance.

18. In the production of these diseases the nature and quality of the water-supply no doubt play an important part. It is clear from the description I have given of what I saw that the nature and quality of the water-supply at Kalka are both alike most faulty and defective.

The natural spring water as it issues into the cistern of the Báoli is apparently of good quality, but from the nature of its receptacle it is at once more or less seriously contaminated by various kinds of pollution such as spilling from the vessels of the drawers, washings from their bare feet or dirty shoes, wind-drifts from the high road, decaying leaves, &c.; whilst the running rivulet called Jhájara Naddi, and the irrigation cuts drawn off from it, are so habitually and largely befouled by washermen, swine, and cattle that its water is never used for drinking purposes except by the poorest classes. Still as it is so used by some it must be reckoned amongst the possible and probable causes of disease.

To provide a wholesome and safe water-supply for Kalka is, I think, of the first importance. To remedy its present faults I would recommend the enlargement and covering up of the present Sherdahan Báoli, and the provision of button-spring stopcocks or hydrants for drawing water from it. I would also recommend the construction of a covered cistern in some central part of the station with similar stopcocks. This cistern to be supplied through iron pipes from the spring in the Sakna Nalah above the highest of the 2 water-mills beyond the bridge. Or perhaps it would be more convenient and economical to convey the water from this spring in iron pipes to hydrants at different convenient spots in this station. Whatever measure be adopted the first necessity is to protect the water from the common means of contamination and pollution.

Summary of suggestions for the sanitary improvement of Kalka.

19. The recommendations then that I would make for the proper sanitation of the very important staging station of Kalka are an increase to the present conservancy establishment of 2 sweepers at Rs. 4 each, and a Darogah at Rs. 10 a month. The establishment of a small branch Dispensary in this station at a monthly cost of Rs. 60 (3rd class Hospital Assistant Rs. 30, Compounder Rs. 8, bhishty Rs. 4, cook Rs. 4, sweeper Rs. 4, medicines Rs. 10) to be paid from District Funds, or from local sources by octroi or house tax, or such other means as may be considered advisable; and the protection of the water-supply, and its distribution to different parts of the station as before indicated. The cost to be met by a special grant from Imperial Revenue, inasmuch as the benefit thus conferred will be, from the nature of the case, of imperial import.

At Kalka I was informed that the place had been surveyed recently in connection with the project of a branch Railway. Should the Railway be brought here as a terminus, there is no doubt the traffic of the place would be greatly increased, and the evil at present existing, unless early remedied and provided against, would become greatly aggravated.

APPENDIX D.

Sanitary Report on the Marri Hill Station, inspected on 16*th,* 17*th and* 18*th March* 1881, *by* SURGEON-MAJOR H. W. BELLEW, C. S. I., *Sanitary Commissioner, Punjab.*

Topographical description of Marri Sanitarium.

1. As stated by Dr. DeRenzy in his Sanitary Administration Report for 1869, the Marri sanitarium appears to have been established in 1851, two years after the annexation of the Punjab, and at first occupied only the Marri Hill, an off-set of the great Himalayan range, in Lat. 33° 34' North and Long. 73° 42' East. It now extends along the main ridge by Topa to Gharial on the north-east, and by Marri proper to the Brewery on the south-west, and includes the adjoining Kuldanna Hill to the north-west in the direction of the military station of Abbott-abad.

The general direction of the Marri ridge is from north-east to south-west, and the elevation of its inhabited portion ranges from 7,000 to 7,500 feet (Trigonometrical Survey). "At Pinnacle Hill, one of its highest points, water boils at 199·4°" (Sanitary Report 1869).

The total area of the sanitarium within Municipal boundaries is 6699·33 acres (Surveyor General's map 1880). Of this area 925·14 acres are covered by the Kuldanna cantonment, 156·72 by the Marri cantonment, and 12·63 acres by the Government Bakery which is situated in the gap between the two cantonments. Besides these, at the south-west part of the sanitarium, are the Brewery occupying 57·30 acres, and the Cliffden Estate for soldiers' families occupying 31.82 acres. The remaining 5,515·72 acres are Municipal land, and constitute the civil station and municipality of Marri, which extends along the main ridge from the Gharial camp on the north-east to the Brewery Estate on the south-west, a distance of about 7 miles.

The station proper, inhabited portion, however, occupies the crest of the ridge, and its upper slopes only between Kashmir point on the north-east and the Lawrence Memorial Asylum, above the Brewery, on the south-west, a distance of about 4 miles. On the eastern slope is placed the native bazár, also, at scattered points, a few European houses. On the western slope, as far down as the cart road from the Kuldanna gap to the Cliffden Estate, are massed together the greatest number of the European houses, the Public Offices, and the married family barracks of the Marri cantonment.

The central and highest part of the ridge, between the points above mentioned, is occupied by the Depôt barrack of the cantonment. The rest of the ridge is occupied by houses for European accommodation, together with their servants' huts and out-offices.

The number of European and native dwelling houses.

2. The number of European dwelling houses in the station is 168, or three more than in 1869. The houses stand on detached sites, and each has its own ranges of huts for native servants, cattle, &c. In the central portion of the station, these houses are much crowded together, and their ranges of servants' huts, stables, &c., are generally very roughly built, and in many instances they are damp and ill ventilated from being built against the hill side.

The European bungalows are principally situated on detached plots along the lines of the main roads, and at the Pinnacle Hill and the Observatory Hill ends of the station occupy more elevated and airy sites than in its other parts.

Of the public buildings the principal are the Post Office, the Court House, and Treasury, Trinity Church, the Club, the Manse, the Kirk, the Roman Catholic Chapel (in course of construction), and several European shops along the line of the Mall. All these are in the central portion of the station and run across the cantonment area. There are besides these, 3 hotels for Europeans in different localities, and the Convent, the Lawrence Memorial Asylum, and the Brewery on the declining ridge beyond Observatory Hill to the south-west of the station.

The native bazár is situated on the eastern slope of the hill in a very deep and steep gully below Trinity Church, and between the Post Office on one side and the barracks of the Depôt on the other. It covers an area of 31 acres, including the Kashmir quarter, and the dhobí's ghát (washerman's settlement) at the lower part of the gully; and contains the following buildings, namely, 51 dwelling houses, 452 native shops, and 10 European shops, these last being at the highest part of the bazár along the line of the Mall opposite the Church. With the native shops are included 343 lodgings, the upper parts of many of these shops being provided for the purpose. The bazár contains besides 2 public sarais and a Police station, a slaughter house, and three public latrines. The population of the bazár is treated of further on.

Public roads.

3. The Marri sanitarium is 39 miles distant from the line of Railway at the military station of Rawalpindi, with which it is connected by a good cart road. On this road during the season, there is a regular postal service for passengers by means of two-horsed cars built expressly for the purpose; they do the journey in from 4 to 5 hours. There is besides a brisk traffic of other vehicles, beasts of burthen, and foot passengers. Marri is also connected by a good hill road with the military station of Abbott-abad in Hazára, and about 42 miles distant to the north-west. This road runs along the upper slopes of the Kuldanna and Dunga Gali hills through the military camps on that line, and, though closed by snow during winter, is much used in the summer season as there is a good deal of intercourse between the two stations. There is another good hill road, a main line of communication, which leads from Marri into the Kashmir Valley; it is much used in the summer season, this being one of the principal routes from the Punjab to that country.

The sanitarium thickly covered with forest trees, &c., &c., and the evils resulting therefrom.

4. The northern and western slopes of the Marri hill are more gradual and present more flat surfaces than on the other sides ; and they are more or less thickly covered with large forest trees, such as the pine (of which family there are several species), the horse chestnut, the sycamore, the oak, hawthorn, cordia, &c., &c. The southern and eastern slopes are generally very precipitous and present few level surfaces ; and they are either entirely bare, or covered with only a thin brushwood composed mainly of wild indigo, barberry, jujube, wild plum, carissa, roses, honey suckle, clematis, &c., &c., and a great variety of common English flowering plants.

The cultivation around the station is very irregular and much interrupted, and every where is in terraced strips against the hill side ; barley, wheat, maize, and rice are the ordinary crops. Potatoes are also largely cultivated on the higher slopes, and in the gardens within the station all the ordinary English vegetables are grown with perfect success.

In many parts of the station the growth of trees and underwood is very thick, and in some parts excessively so, especially in the hollow of the western slope which forms the central part of the station and is situated between the mall and the cart road to Pindi. This part of the sanitarium is naturally, owing to the configuration of the hill, disadvantageously situated for ventilation, and the natural defect is very seriously aggravated by the obstruction to free movement of air caused by the overgrowth of its vegetation.

This is a point which requires very careful attention, for this is the part of the station where the houses are most closely set together and the population most densely packed. I have reason to believe also, from my local knowledge of the place and the experience acquired during two years as Civil Surgeon of the station (in 1860 and 1861), that sickness is more rife and epidemics are more violent in this part of the station than in the more elevated, better ventilated, and less crowded parts on either side.

This overgrowth of trees and underwood not only detracts from the salubrity of the site by obstructing its ventilation, but is in other ways injurious in its effects. For instance the rank growth of the underwood and herbage especially, impedes the free drainage of the surface soil, and thus renders the atmosphere of the locality immoderately damp, and for a protracted period. At the same time it hinders proper scavenging operations by concealing from view the impurities which accumulate on the surface wherever human habitations are fixed.

The evils resulting from this overgrowth of vegetation then are, an obstructed ventilation and consequent protracted dampness of the atmosphere, and an impeded conservancy with its consequent contamination of soil, air, and water. The remedy is simple—removal of the cause ; and this can be easily effected not only without the smallest injury to private property, but with greatest advantage to the public welfare. I would most strongly recommend a regular clearance of the whole of this central portion of the station from the Church to the Observatory Hill, by a systematic thinning of its overgrowth in every compound. Most of the saplings and minor trees now crowded together about the houses might, with great advantage, be felled and cleared away ; the underwood and herbage, with the exception of a healthy bush here and there, should be entirely removed ; and the larger trees should have their branches lopped off up to a height of 10 or 12 feet from the ground.

With the ground about the houses once cleared, it will be an easy matter to keep the place decently clean and with careful supervision on the part of the municipality there should be no difficulty in preventing the growth of rank vegetation in the compounds. The subject is one of great importance and requires the early and careful attention of the Municipal authorities.

Its geological formation as stated by Dr. DeRenzy and by Mr. A. B. Wynne of the Geological Survey.

5. The geological formation of the Marri hill, as has been stated by Dr. DeRenzy in his Report for 1869, is a calcareous sandstone which is found in two different forms ; the one hard, durable, and of grayish colour, and the other much softer, friable, of a reddish colour. The former is the stone used for building purposes throughout the station, and the latter, disintegrated by exposure to the weather, forms the banks of hard clay and the soil of the hill ; it contains oxides of iron, also lime, and magnesia in large proportions.

From the Memorandum by A. B. Wynne, Esquire, Geological Survey, published in my Sanitary Report for 1877, it appears that the position of the tertiary sandstone, and clay of the Marri strata, is favorable to a large amount of natural filtration, " in fact too large to allow of numerous or copious springs being found within the station."

Further on Mr. Wynne observes—" The endless alternation of jointed sandstone and impermeable clay strata is an arrangement of the rocks in the Murree [Marri] hill highly conducive to the percolation of rain water through the whole hill and to great depths. The steep sloping beds coming to the surface would lead the water into the hill and over much of the ground. The tendency would be to discharge it on the northern side, on to the north-west, from the dip side of the strata.

But the station itself occupies the local catchment area, the houses are built on the highest points, the water naturally issues from below, and with regard to mere surface drainage all the objections of Dr. Gray's Memorandum have of course full weight and force. " [Para. 16 of Dr. Gray's Memorandum here referred to is as follows :—" But the drinking water of the station is liable to contamination from other causes than those operating at the tanks. The collecting ground consists of the sites on which the houses of the station are built, and in many cases the houses are close to the tanks. Moreover from the geological formation of the Murree [Marri] hills, there is very little natural filtration. The springs (I mean those in the station) probably in no single instance come from a great depth, the rain water merely percolating through the surface mould, and then running along the smooth sandstone or impermeable clay with which it is in some places covered. The dip of the strata is north-west, and it is on the northern side of the station that almost all the tanks are situated. From the above considerations it is evident that if the greatest care is not taken in regard to the cleanliness of the station, if night soil, litter and filth are not prevented from accumulating in the compounds, contamination of the water must take place, however effectual may be the means of protecting it, at the tank"]. "Still it seems to me," continues

Mr. Wynne, "that at many points not far below the station, the internal waters of the hill might be tapped by nearly horizontal drivings and the water so obtained would, at least, have the advantage of natural filtration. From the nature of the rocks traversed, I should suppose that water naturally filtered in this way would contain some lime and probably a good deal of iron. The quantity would of course depend, as it does now, upon the rainfall, but would probably be a much more permanent supply than there is at present. With regard to mere surface drainage percolating through a highly organic mould, and running over the surfaces of smooth sandstone beds, I should think that the cases where this occurs are very rare. The quantity of water which sinks through the vegetable mould and meets stiff clay and rock surfaces runs off quickly, but a large amount is doubtless absorbed by the most superficial portion of the rocks beneath, and is slowly filtered in its downward passage through and among them, while any permanent springs would probably, if not certainly, come from it may be widely distributed sources not more deeply situated with regard to the mass of the hill, than the points at which they issue., The height at which such springs are found would thus be some indication, as to the levels at which a permanent supply of water may be attainable, and testing the water of the springs where there is least likelihood of superficial organic matter being taken up by the water, would be a guide as to the purity of the water likely to be obtained. In any effort to obtain water from the interior of the Murree [Marri] hill, the disposition of the strata in the vicinity of the place where the trials or 'drivings' might be made, would require attentive consideration. Natural springs would probably be good guides as to locality. Any water obtained in this way would, I need scarcely add, be much superior to that caught in ordinary tanks."

I have reproduced these passages here as it will be useful to bear in mind their tenor when we come to consider the subject of the water-supply of Marri.

Meteorology.

6. The Meteorology of the station is represented in the subjoined tabular statement whch shows by months the observations recorded during the series of years from 1875 to 1880, inclusive.

Monthly abstract of Meteorological observations registered at Marri from the year 1875 *to* 1880, *inclusive.*

Months.	Barometer (Mean).							Hygrometer (Mean relative humidity.)							THERMOMETER.														Rain-fall.						
															Mean Temperature.							Mean daily range.													
	1875.	1876.	1877.	1878.	1879.	1880.	Mean.	1875.	1876.	1877.	1878.	1879.	1880.	Mean.	1875.	1876.	1877.	1878.	1879.	1880.	Mean.	1875.	1876.	1877.	1878.	1879.	1880.	Mean.	1875.	1876.	1877.	1878.	1879.	1880.	Mean.
January ..	23·793	23·792	23·919	23·880	23·883	23·852	23·53	57·0	59·0	57·8	58·6	33·0	40·0	50·9	42·0	44·5	44·15	38·15	47·55	45·70	43·67	26·71	22·2	9·9	12·6	14·4	13·4	16·53	..	..	0·08	1·12	..	0·53	0·29
February ..	23·807	23·788	23·835	23·856	23·838	23·764	23·815	66·0	53·8	60·9	68·2	40·0	59·0	57·10	41·5	41·5	41·65	41·7	46·75	41·55	42·42	23·89	24·0	12·1	11·1	15·7	12·8	16·60	3·43	1·19	..	9·12	0·39	0·28	2·40
March ..	23·823	23 782	23·863	23·891	23·831	23·879	23·845	51·0	52·5	53·1	43·1	57·0	33·0	48·3	56·0	51·0	45·65	51·85	51·30	62·80	53·10	31·29	24 9	15·3	15·0	13·0	16·5	19·33	2·45	3·14	2·73	0·48	5·20	0·17	2·36
April ..	23·785	23·773	23·887	23·836	23·818	23·823	23·820	39·0	37·9	62·8	59·0	39·0	36·0	45·6	64·0	61·5	55·35	57·05	61·95	67·60	61·24	35·17	25·8	14·1	14·6	16·6	17·4	20·61	1·16	3·12	7·78	8·25	0·60	0·72	3·6
May ..	23·792	23·751	23·820	23·788	23·782	23·774	23·784	44·0	38·4	59·0	61·0	24·0	38·0	44·1	63·0	67·0	65 2	62·95	73 30	65·75	66·20	40·94	27·1	15·1	14·1	17·3	19·3	22·32	3·60	3·20	2·69	7·52	0·83	3·31	3·52
June ..	23·714	23 712	23·772	23 742	23·670	23·681	23·715	43 0	34·9	48·6	41·0	64·0	36·0	44 9	68·0	73·0	73 2	69·25	68·70	76·85	71·50	47·10	26·8	17·0	16·7	15·7	19 2	23·752	2·26	2·50	1·95	1·01	5·76	4·22	2·95
July ..	23·680	23·632	23·730	23·729	23·683	23·676	23·688	76·0	79·1	51·3	69·0	73·0	78·0	71·1	73·5	76·5	7 0·2	74·10	70·70	67·15	72·02	22·74	15·4	18·4	13·9	15·0	17·0	17·07	18·80	19·0	2·52	9·49	7·38	11·25	11·47
August ..	23·690	23·718	23·772	23·759	23·712	23·725	23·729	77·0	86·3	43·6	89·0	88·0	73·0	76·1	69·0	68·5	72·3	69·6	69·25	67·60	69·37	26·03	13·0	18·9	11·7	11·4	18·1	16·52	1·83	18·8	1·68	22·58	19·20	7·03	11·85
September ...	23·785	23·806	23·868	23·802	23·802	23·829	23·815	74·0	63·6	..	66·0	62·0	61·0	54·4	68·0	66·0	66·45	68·10	60·25	65·80	65·77	24·33	15·5	15·4	15·5	15·3	16·3	17·05	6·12	3·05	3·27	2·07	5·72	9·02	4·87
October ..	23·858	23·889	23·934	23·874	23·907	23·925	23·898	50·0	65·8	58·9	40·0	40·0	31·0	47·6	59·5	56·0	60·75	61·6	61·75	62·60	60·37	26 58	18·4	13·3	17·5	16·5	18·7	18·50	2·77	4·41	9·10	1·17	0·03	0·23	2·95
November ..	23·903	23·892	23·928	23·899	23·894	23·932	23·908	53·0	55·7	66·1	32·0	34·0	42·0	47·1	55·0	50·0	45·65	56·2	551·0	54·80	52·12	23·63	17·4	11·2	15 4	16·5	16·8	16·82	1·62	1·92	10·59	..	..	0·12	2·37
December ..	23·878	23·932	23 884	23·871	23·862	23·863	23·882	58·0	41·6	66·0	36·0	37·0	52·0	48·4	48·5	43·35	40·65	51·35	46·75	44·95	45·92	20·90	19·3	10·3	15·3	14·5	14·2	15·75	1·95	..	5·37	..	..	1·46	1·46
Yearly mean ..	23·792	23·789	23·851	23·827	23·808	23·810	23·809	57·33	55·7	52·3	55·2	49·2	48·2	53·00	59 0	58·24	56·77	58·49	59·10	60·26	58·64	29·11	20·8	14·2	14·4	15·1	16·6	18·39	45·99	60·33	47·76	62 81	45·11	38·34	50·09

Population.

7. The population of the Marri sanitarium varies according to the seasons, and reaches its maximum figure about the middle of the year. The influx of visitors for the summer season commences about the middle of April, and rapidly increases up to about the middle of May, by which time the station is generally full. The exodus begins early in October and goes on till about the end of November, by which time the population is reduced to its minimum which represents the permanent residents.

The information regarding the numbers of the population at these two seasons, the summer and the winter, is very defective, owing to the absence of regular census enumerations and the shifting habits of the visitors, a considerable number being merely temporary sojourners on the way to or from Kashmír. It is further useless, as an index to the salubrity of the locality, measured by the incidence of sickness and mortality amongst the general population from the fact of its being a healthy resort for the Europeans stationed in the northern and western districts of the Province, and indeed of the Punjab generally till the year 1876 when the summer seat of the Provincial Government was transferred from Marri to Simla; because amongst the visitors to the sanitarium generally, whether civilians or military, there is always a large proportion of invalids, and others in a more or less seriously debilitated state of health from diseases or ailments contracted elsewhere.

The subjoined tabular statements shew the statistics of the population according to the census enumerations made in July 1869 and October 1877.

MARRI.

Statistics of population according to census taken on 22nd July 1869.

	Number of houses.	Age.												Grand Total.		
		Under one year.		*One to five.*		*Five to ten.*		*Ten to twenty.*		*Twenty to forty.*		*Over forty.*				
		Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Total.
European ...	165	44	36	115	116	101	110	82	78	530	285	79	24	951	649	1,600
Native ...	435	40	34	219	161	253	138	907	149	5,543	577	858	126	7,820	1,185	9,005
Total ...	600	84	70	334	277	354	248	989	227	6,073	862	937	150	8,771	1,834	10,605

Statistics of population according to census taken on 3rd October 1877.

	Number of houses.	Age.												Grand Total.		
		Under one year.		*One to five.*		*Five to ten.*		*Ten to fifteen.*		*Fifteen to forty-five.*		*Over forty-five*				
		Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Total.
European ...	...	25	18	72	60	111	113	28	82	275	250	30	18	541	541	1,082
Native ...	...	31	25	109	97	120	104	214	59	4,510	548	517	90	5,501	923	6,424
Military ...	...	7	6	25	52	30	20	11	16	217	59	6	4	296	137	433
Total ...	...	63	49	206	189	261	237	253	157	5,002	857	553	112	6,338	1,601	7,939

The last census was taken in the year after the transfer of the summer seat of the Provincial Government to Simla; both statements include the military residing in cantonments, and both were made at the season when the station is at its full of visitors.

Regarding the population during the winter months no such exact information is available.

From the statement furnished to me by the Secretary to the Municipal Committee, in reply to enquiries at the time of inspection, it appears that the population of the native bazár during the winter months is only 228 souls, whilst the number given for its summer population is 2,000. The winter population of the civil station, exclusive of the cantonments, is given as 23 European families, or 280 souls including the Convent school. If we reckon an average of 10 native servants with each European family, we get a native population of 230 for this part of the station, that is to say, the central portion of the sanitarium. Besides these there are the residents in the Marri, and Kuldanna cantonments, in the Cliffden barracks, the Lawrence

Asylum, and the Brewery, all of which are within the Municipal boundaries, though with the exception of the Marri cantonment, they form distinct and distant or at least detached communities.

Statement showing the mortality from different diseases from 1871 to 1880, and remarks thereon.

8. Regarding the statistics of sickness and mortality amongst the troops and their followers in cantonments there is no information in this office. With respect to the civil population, however, the death reports furnished to this office enable me to compile the subjoined statement showing by months the mortality in Marri from the chief diseases for the series of years from 1871 to 1880, inclusive—a full decade.

Statement showing the deaths from different diseases in the Marri Sanitarium during each month of the years from 1871 *to* 1880 *inclusive.*

Population according to Census of 1877——7,506.

Months	Cholera.										Small-pox.										Fevers.										Bowel complaints.										All other causes.										Total.									
	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.
January ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	2	...	...	...	1	...	1	3	2	...	...	...	...	...	...	...	...	...	1	...	1	...	2	...	...	2	1	1	...	1	3	...	2	...	1	2	2	4	3
February ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	1	4	2	...	...	...	1	...	...	...	...	...	1	1	...	...	1	...	3	...	3	...	3	1	...	1	2	...	3	...	4	4	6
March ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	2	1	1	...	2	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4	1	...	...	1	...	2	1	1	...	6	4	...
April ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	2	1	...	1	1	13	2	...	...	...	...	1	...	1	...	...	...	...	4	2	...	1	1	1	...	6	1	...	6	2	2	3	1	3	1	19	3	...
May ...	...	...	...	...	...	...	...	...	7	...	...	...	...	...	...	...	...	...	...	...	3	1	3	2	7	2	1	11	17	4	...	2	...	1	3	...	1	2	1	...	3	1	8	3	5	4	6	5	...	2	6	4	11	6	15	6	8	18	25	6
June ...	...	...	...	...	...	...	...	...	16	...	...	...	...	...	...	...	...	...	...	...	5	5	4	5	1	7	1	7	13	5	...	...	...	...	...	1	...	6	3	1	20	3	7	2	5	2	4	7	6	3	25	8	11	7	6	10	5	20	38	9
July ...	...	...	...	...	...	67	...	...	34	...	...	...	...	...	...	...	...	...	...	...	4	1	1	4	1	8	2	14	15	5	4	2	2	1	...	...	...	1	...	...	16	3	8	6	...	4	4	7	1	4	18	6	11	11	1	79	6	22	50	9
August ...	...	12	...	...	...	39	...	...	...	...	1	...	...	...	...	...	...	1	...	...	4	3	4	4	1	3	3	15	17	6	3	2	2	...	1	1	...	1	3	...	16	4	5	1	1	1	1	4	5	...	24	21	11	5	3	44	4	21	25	6
September	...	44	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	1	3	1	1	...	2	8	27	4	1	1	1	2	1	...	...	1	2	1	2	6	6	...	1	1	2	5	1	1	5	52	10	3	3	2	4	14	30	6
October ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	3	1	3	1	...	27	25	4	2	...	...	1	...	...	1	1	1	2	3	1	2	2	4	1	4	...	4	...	7	1	5	4	7	2	5	28	30	6
November ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	1	...	1	1	1	...	17	14	2	...	...	...	...	...	1	...	...	1	...	2	2	2	...	...	...	1	...	1	3	5	3	2	1	1	2	1	17	16	5
December ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	...	...	2	...	...	...	8	14	2	...	...	...	...	...	1	...	...	1	...	...	1	...	...	...	1	...	1	...	1	...	1	...	2	...	2	...	11	15	3
TOTAL ..	...	56	...	...	...	107	...	...	57	...	1	...	...	...	...	...	...	3	...	...	26	15	21	23	16	25	10	124	154	36	10	7	5	7	5	5	2	12	12	6	61	24	38	18	17	18	24	43	21	17	98	102	64	48	38	155	36	182	244	59

A glance at the column of "totals," which gives the entire mortality registered in each month of the series of years, will show that the mortality commences to rise in April with the influx of visitors, that it increases suddenly three or four fold during the months of June, July, and August, the rainy season, and as suddenly subsides to the previous figures till November, when with the exodus of the visitors it falls to the smaller figures representing the mortality amongst the resident winter population.

The yearly total given at the bottom of the columns shews that the annual mortality rises and falls in different years according to the healthiness or unhealthiness of the seasons in general unison with the results obtained in respect to the mortality of the whole Province during the same decade, and is not assignable to any special local causes independent of the general influences which affect the health standard of the whole Province. Thus the healthy years of the decade at Marri were 1871, 1873, 1874, 1877 and 1880, the unhealthy ones were 1872, 1875, 1876, 1878 and 1879. The corresponding years for the whole Province were with one exception (and that in favor of Marri), precisely the same, as will be seen by the subjoined statement of the total mortality registered in the Punjab during each of the same series of years.

Comparative Statement showing the mortality registered in the whole of the Punjab Province and in the hill sanitarium of Marri during the healthy and unhealthy years from 1871 *to* 1880 *inclusive.*

Healthy years.			*Unhealthy years.*		
Years.	Total deaths registered in the Punjab Province.	Total deaths registered in Marri.	Years.	Total deaths registered in the Punjab Province.	Total deaths registered in Marri.
1871 ...	363,378	98	1872	430,608	102
1873 ...	357,153	64	1875	447,208	38
1874 ...	316,713	48	1876	496,844	155
1877 ...	350,932	36	1878	628,771	182
1880 ...	472,731	59	1879	673,213	244

Cholera epidemics.

9. Turning now to the column of the chief diseases we find, taking them in their order, that the sanitarium was visited by cholera in 3 out of the series of 10 years, namely in 1872 1876 and 1879, and each time in an epidemic form. But these are not the only occasions on which epidemic cholera has made its appearance at Marri; two other visitations have been recorded prior to the registration of mortuary statistics being established in 1869, and these occurred in the years 1858 and 1867.

The first appearance of cholera at Marri, of which we have a record, occurred in the year 1858, in the seventh year after the occupation of the station as a sanitarium; the next occurred in 1867 after an interval of 9 years. How often, and at what intervals the disease has affected the native population of the hill prior to the British occupation there is no information to shew, though it is as likely as not that the disease was by no means unknown here.

Of the epidemic in 1858, no record was kept of the mortality from cholera among the civil population, beyond the statement that no European families were affected; and the only information available regarding its history is derived from the report of a special Medical Committee assembled at Marri in July 1858 to investigate the circumstances attending the appearance of the disease amongst the troops in the Depôt there, as described in the Sanitary Report for 1869 page 34. Thus we have the records of three cholera epidemics during the 11 years since the registration of deaths was established, and those of only two during the preceding 19 years of British occupation prior to the establishment of registration.

Mortality from small-pox.

The column of "small-pox" mortality very properly shows a merely nominal death roll, the figures being one death from this disease in 1871 and 3 in 1878 both years being epidemic seasons in the Punjab generally.

Mortality from fevers.

The "fevers" column is very instructive and excluding the years 1878 and 1879 shows very clearly the comparative immunity of a hill climate from that class of diseases. The higher figures in the years above excluded are owing to the exceptional causes which combined to render those years the most unhealthy of which we have any record throughout the Province, as described in my Sanitary Report for those years. The exceptional causes referred to were seasons of heavy rain-fall following a prolonged period of drought and coupled with the general distress consequent upon high prices of food.

Mortality from bowel complaints.

The column of "bowel complaints" also shews results favourable to the character of a hill climate in respect to that class of diseases, especially when we consider that the bulk of the visitors to the sanitarium are invalids or more or less debilitated in constitution from diseases previously contracted elsewhere.

Mortality from all other causes.

The "all other causes" column as was to be expected shews a generally high array of figures representing the mortality from inflammatory affections of the internal viscera and diseases of child-birth and infancy originating in the locality itself, together with that from chronic diseases contracted elsewhere; death causes acting independently of epidemic or atmospheric influences.

The extent to which the mortality is affected by atmospheric influences.

10. As before stated, no practical deductions can be drawn from these mortality tables, owing to the peculiar circumstances connected with the health standard of the population and its constantly fluctuating numbers. The tables, however, are useful as shewing the seasons in which mortality is highest, and the extent to which it is affected by atmospheric influences of general and wide-spread operation.

By reference to the Meteorological Statement given on a preceding page it will be seen that the period of highest daily range of temperature combined with rain-fall and atmospheric humidity coincides with that in which the highest mortality occurs. We have no clear knowledge of the manner in which, or the extent to which, these undoubted factors in the production of mortality are influenced or affected by the electric or magnetic conditions of the soil and atmosphere, though there is little doubt that the agency of such electricity or magnetism does exercise a very important influence in the production of epidemic mortality.

But we have very fair information as to the manner in which, and the extent to which mortality is affected by local insanitary conditions of air, soil and water—conditions too which are more or less entirely under our control and capable of remedy. It is to these that our attention is mainly required. How far the insanitary condition of the Marri sanitarium is responsible for the alleged increasing unhealthiness of the place will be gathered from what will be presently said regarding its conservancy arrangements, that is to say, the sanitation of its air, soil, and water. But before proceeding to describe the state of the station generally I introduce here a brief account of one particular part of it in which the conservancy arrangements are carried out in a very complete manner.

Proper sanitation carried out in Lawrence Memorial Asylum and the effects thereof on the health of the children very satisfactory.

11. For the sake of comparison and as an illustration of the good effects of proper sanitation I subjoin a tabular statement showing the mortality from the different death causes in the Lawrence Memorial Asylum in this sanitarium for the years 1870 to 1880, inclusive.

Lawrence Memorial School at Marri.—Causes of Deaths in Hospital.

Years.	Average Strength			Cholera.			Small-pox.			Fevers.			Bowel Complaints.			All other causes.			Total.			Remarks.
	Boys.	Girls.	Total.	Boys.	Girls.	Total.	Boys.	Girls.	Total.	Boys.	Girls.	Total.	Boys.	Girls.	Total.	Boys.	Girls.	Total.	Boys.	Girls.	Total.	
1870 ...	65	57	122	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
1871 ...	70	58	128	...	...	...	...	...	...	...	...	...	...	1	1	1	...	1	1	1	2	
1872 ...	69	55	124	...	...	...	..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
1873 ...	68	61	129	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
1874 ...	70	58	128	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
1875 ...	75	63	138	...	...	...	...	...	...	...	...	...	...	...	...	...	2	2	...	2	2	Measles 1.
1876 ...	79	64	143	...	...	...	...	...	...	...	...	...	1	...	1	...	...	...	1	...	1	
1877 ...	84	65	149	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
1878 ...	84	63	147	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
1879 ...	86	62	148	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
1880 ...	87	63	150	...	...	...	...	...	...	...	...	..	...	...	...	...	...	...	...	...	...	
Average for the 11 years ...	76	61	137	...	...	...	...	...	...	...	...	...	1	1	2	1	2	3	2	3	5	

It will be seen that during these 11 years there were only 5 deaths amongst the children in this institution, the average yearly number being 137 boys and girls together, and that no death has occurred amongst them during the past 4 years. The Asylum is situated on the crest of the declining ridge of the Marri hill between Observatory Hill and the Brewery, and is completely detached from the populous part of the station, being about half a mile below Observatory Hill, and about half that distance again from the convent school which occupies an intermediate position.

I inspected the Asylum throughout and found it everywhere in most creditable order. The dormitories, lavatories, hospital wards, school room, pantries, and play grounds were admirably kept, and the children appeared in the picture of health. The bedding, clothing, and food were all good in quality, and supplied in liberal quantity. There were 3 little girls and 1 boy in the respective hospital wards, but only with trivial and transitory ailments. The cook house and latrine arrangements were carefully attended to, and I found both places in a remarkably clean and wholesome state, and perfectly free from offensive sights and smells. In respect to light and ventilation the Asylum is very well provided for ; the drainage arrangements also are simple and good, the site naturally affording unusual facilities for the direct and rapid off flow of water down the steep hill slope on either side. The privy soil is utilized as manure in the vegetable garden where it is trenched at some distance from the Asylum buildings. The water-supply, from a perennial spring of clear sparkling water, is covered with a masonry dome where it issues on the surface, and the water is drawn from an iron spout into which it is turned on by a stop-cock kept under lock and key. Below this spring is another which feeds a masonry tank used as a swimming bath for the boys. The ground above, or catchment area, is also preserved being covered with the ordinary brushwood and timber of the hill, and the grazing of cattle upon it being prohibited. The result of my inspection was all the more satisfactory as I visited the place without previous notice and my arrival was quite unexpected.

Drainage and sewerage.

12. In the station of Marri there is no artificial system of drainage, this being naturally effected by the numerous water-courses and gullies on the steep slopes of the hill. By these channels all the surface drainage flows off rapidly, leaving no stagnation of water anywhere on the surface; though there are many spots where the passage of the water is obstructed by boulders in the channels of the gullies and water-courses by which the sides of the hill are furrowed. In some of these spots where the flow of surface drainage is obstructed, the water with the filth carried down by it accumulates and forms little puddles which soon become very foul and offensive till scoured out by fresh falls of rain. The air about these obstructed water-courses, though not always perceptibly foul to the sense of smell, has been frequently observed to exercise a depressing effect on the system of those exposed to its inhalation.

Neither from the circumstances of the situation, is the station provided with any artificial system of sewerage, except a very defective and faulty one in the native bazár, where the houses are massed together in rows forming streets. The houses for European accommodation are all built separately on detached sites at greater or less distances apart over the extent of the station. Many of the houses are badly situated as regards ventilation and drainage, and in the central part of the station are a good deal crowded together with their servants' huts and out-houses close about them.

Its very insanitary condition as described by Dr. W. A. Roe.

13. At the time of my visit there was still a good deal of snow upon the ground, and stormy weather prevented my going over the station as thoroughly as I had hoped to do. Still in several places on the hill sides I found traces of the filth and rubbish which during the preceding season had accumulated on the surface, such as empty tins of European preserved meats, shreds and rags of foul clothes, fragments of crockery, bleached bones, and cinders of ash-heaps &c., and I can quite understand the state of affairs being quite as bad as is described by the Civil Surgeon, Dr. W. A. Roe, in his letter of 28th July 1880, to the address of the Deputy Commissioner Rawalpindi district. He states :—

> "The next point to which I wish to draw attention is the condition of the hill sides, and I do not exaggerate when I state that on all sides I saw heaps of filth and fœcal matter; the sides of the hill extending from the Dispensary to Viewforth Hotel and beyond it being especially bad, the contents of privy pans having been thrown out in the open on the top of rubbish of all sorts, and left there to putrify and breed disease, and from what I have heard, this side of the hill is notoriously unhealthy and has always been so; and last year several cases of diphtheria (a known filth disease,) occurred in a house just over where one of these cess pits existed, and it seemed to me that these heaps were the accumulations of years and the result of an utter disregard of all Sanitary precaution."
>
> "When I first inspected the pits used for burying night soil, &c.," continues Dr. Roe," they had never been covered in properly and in many of them the refuse could be seen sticking up through the thin stratum of earth thrown over it by the sweepers. Every where I saw heaps of manure lying out exposed to the action of the elements, at one time soaked by heavy rain the deleterious fluid sinking into the ground to pollute springs, at another time dried up by a powerful sun, pulverized by the wind and carried into every open tank and water-course in the place, abominable gases being given off from decomposition polluting the air and offending the senses of every one. And under such circumstances I am not at all surprised that disease of all kinds has at different times appeared and that epidemics are severe when they visit this station."
>
> "I have brought all this to the notice of the Municipal Committee," Dr. Roe adds, "and I am glad to say that efforts are being made to improve the place; but the result of years of pollution cannot be remedied in a few months, and it will require the strictest supervision and considerable expenditure of money to render the sanitary condition of the place what it ought to be.".

Dr. Roe's description here refers mainly to the vicinity of the filth pits on the steep eastern slope of the hill beyond the native bazár, a spot which is well removed from the populous parts of the station. But I can understand that the description is applicable in somewhat moderate degree to the state of affairs all over the station judging from the traces I myself saw in the populous area between the Club and Observatory Hill.

With reference to the native bazár Dr. Roe states—

> "The first thing that struck me was the filthy condition of the bazár and the state of its drainage, most of the rain water being carried down a sort of natural channel in the middle of the street, the drains on either side of the roadway having been covered over with large stone flags by the native shop-keepers for the purpose of enlarging their premises to expose their goods for sale, and the small open spaces between the coverings were used as receptacles for all kinds of filth and rubbish; and lower down the hill where the drains are much deeper they were actually used as night latrines as I saw in several places the filth and fœcal matter remaining from the night before, and in some places it had evidently remained for several nights as well as filth of all kinds, rotting, stinking and polluting the air."
>
> "Another crying evil" continues Dr. Roe," is the latrines in use on the tops of the houses in the bazár, and I can convey but a very faint idea of the smell and condition of these places, the wood work and the ground around being literally saturated with urine and filth, and close by one of the places I found a spot where a sweeper had actually buried the filth from the latrines rather than carry it to the pits, and under such circumstances I can quite imagine such places as centres of cholera during an epidemic, and it is perfectly evident to me that unless very strict Sanitary control is exercised and natives compelled to keep their places clean, and severely punished if they fail to do so, every epidemic which may visit this place will become more severe and deadly in its characters."

Sanitary Commissioner's suggestion in reference to an efficient system of sewerage and drainage as well as for its general conservancy.

14. The state of affairs thus described is sufficiently grave, and discreditable to the Municipal management at Marri, and the picture is not overdrawn. I carefully went over the whole bazár and can testify to its very filthy condition. Yet the site possesses unusual natural facilities for an efficient system of sewerage and drainage, as well as for its general conservancy.

In the native bazár, the site of which is very precipitous, the main street runs down from the mall in front of the Post Office in an oblique direction across the steep eastern slope of the hill, directly below the site of the Church. Its lower portion lies horizontal, and is about 100 feet below the mall. Lower down than this level portion are two other parallel and shorter streets, and these are intersected by 3 or 4 steep cross streets. The bazár in fact is built in tiers up the precipitous side of the hill, and occupies the hollow of a deep gully on its eastern slope. This gully is formed by the bluffs of the three peaks or eminences which mark the outline of the hill at this part of the ridge; the eminence on the south-west is occupied by the barracks of the Cantonment Depôt; that on the north-east by Thornton's Hill and the sites of the former Government house and adjoining European bungalows; whilst the eminence between them and to the westward is occupied by Trinity Church and adjoining European bungalows. The mall runs across the situation between the Church and top of the bazár which is formed by a row of European shops fronting to the mall.

The site of the bazár is thus overtopped on three sides by these detached eminences, and is consequently unfavorably situated in respect to ventilation. On the other hand, it is advantageously situated in respect to drainage if the natural facilities of the surface were taken advantage of.

In its present condition the system of drainage and sewerage of the bazár is most defective and faulty. In fact there is no system whatever. The streets are very rough and uneven, and their side drains are deep, narrow, angular channels, on no regular gradients, and roughly built of loose stone. Originally the drains were open throughout their course, but now they are covered at short intervals opposite the shops by flags of stone laid across; in many parts their floors are undulating, and thus form stagnant puddles of obstructed sewage. These drains discharge abruptly (but only when scoured by heavy rains) at different spots into the natural water-courses on the surface of the hill, and at the time of my inspection were more or less choked with sewage matters mixed up with snow which had not yet melted. In the main street these drains, which are open in most of their course, are in some parts only 6 inches deep, and in others as much as 4 feet deep, thus producing ups and downs in the channel and the formation of a series of sinks in which the sewage stagnates.

All this can be easily remedied by the construction of a regular system of open surface gutters along each side of the street, the roadway of which should be laid down with metal and convexed, the whole series to discharge by one or more out-falls into timber shoots or masonry drains built into the channel of the natural water-courses at suitable sites. For their regular flushing during the dry months one or two water tanks should be provided at each end of the highest part of the bazár, say near St. George's Terrace on one side and Doctor's Commons on the other. With such provision the waste water from the houses in the bazár would find a ready and rapid outlet, and would very quickly flow off down the hill by its natural drainage channels; there would then be some chance of keeping the place in a decently clean and wholesome condition, and that too with a smaller conservancy establishment than is at present employed for the service of this most crowded and filthy part of the station.

The area and the number of houses in the native bazár, including the washerman's quarter at the bottom of the gully, and the quarters for Kashmíri laborers at the lowest part of the bazár, have been given in a previous passage. Exclusive of the 452 native shops and the 10 European at the top of the bazár, fronting the mall, there are 51 dwelling houses in the bazár, and 343 lodgings mostly in the upper storeys of shops furnished for the purpose, and this represents the house accommodation for visitors of the entire native bazár. During the winter months the population is about 250 in round numbers (the actual figures given me by the Secretary to the Municipal Committee being 228), but the number is said to rise to 2,000 souls during the summer season, or say 13 persons to each of the 513 houses.

I have no data wherefrom to arrive at even an approximate calculation of the average dimensions of these houses, or to form an idea of the cubic breathing space for each of their inmates. But, considering that, with few exceptions, the buildings are mere native huts crowded together (built up against the hill-side in many places), and placed in a situation which is naturally very defective in point of ventilation, the overcrowding here during the summer season must be of a very unwholesome, if not directly dangerous, nature even when no epidemic influences are abroad.

More than ordinary care therefore is necessary to enforce the most vigilant and unceasing supervision of the conservancy arrangements of this most densely populated part of the station, especially as it is neither advisable nor practicable to extend the area of the bazár in this unsuitable situation. Perhaps, as suggested by His Honor the Lieutenant Governor, it may be found practicable to relieve the overcrowding here by the establishment of a new bazár at Jikri Gali between Kashmír point and Topa hill. The site possesses advantages of position to recommend it for this purpose.

At all events no suggestions for increasing the number of houses in the present bazár should be entertained, as it is already sufficiently hemmed in by other buildings, *viz.*, the police station and depôt barracks, and lower down the lock hospital and sepoy lines on the south side, and Force's shop, Doctor's Commons, the Dispensary, and a public latrine on the north side.

This public latrine is situated below the road leading to the native burial ground, and is a quadrangular, roofless structure, built of stone, and divided into compartments. I did not enter it, but I understand that it is provided with no utensils, and is certainly unfitted for the dry earth service, if that is even ever thought of. Dr. Roe has described the filthy state of the latrines in the private houses of the bazár; but had he examined those for the use of native servants in his own or any other compound in the station, he would have found them in the same filthy condition.

The evil is the result of the utter neglect of forethought and consideration on the part of the Municipal Committee with whom rests the responsibility of the conservancy arrangements for the station. A latrine, whether public or private, should be a roofed building, the roof supported on props for free ventilation, divided into compartments, and furnished with proper utensils in each. At each end of the range should be a shed, one for the storage of dry earth and the sweeper's brooms, shovels, and baskets, the other for the soil buckets in which the ordure is collected prior to removal to the dung-pits or manure-stores as the case may be. The sweeper told off to the service of the latrine should be provided with a broom, a hand shovel, and a basket for each man; they should be instructed to remove the contents of the privy utensils into the soil buckets, and the jamadár of the gang should be held responsible that his men do the work regularly and systematically. These directions apply not only to public latrines but to those in private houses.

The existing conservancy establishment should be re-organized.

15. The very discreditable state of the conservancy of Marri station is entirely owing to utter neglect of supervision and faulty arrangements, and not to any want of establishment or working staff. If the Civil Surgeon, as a Member of the Municipal Committee, would take up the subject seriously and once for all organize the conservancy establishment in a proper working order, and see that they were provided with the requisite implements and instructed in the manner of their work, there would be some chance of the scavenging of the station being efficiently performed.

The conservancy establishment for the whole station as at present constituted consists for the summer season of the following staff :—

80	Sweepers	@ Rs.	6 0 0	each a month	... ...	Total Rs. 480
6	Jamadárs	@ „	6 8 0	„ „	... ...	„ 39
4	European Overseers	@ „	20 0 0	„ „	... ...	„ 80
1	Do. Food Inspector	@ „	25 0 0	„ „	... ...	„ 25
						Total monthly cost Rs. 624

of this establishment 27 sweepers, with 1 jamadár or gang master and 1 European Overseer, are allotted to the service of the native bazár. The remainder of the establishment is distributed over the rest of the station. The Food Inspector's duties lie in the bazár.

The general conservancy arrangements in force, as described by the Secretary to the Municipal Committee, in reply to a series of questions on the subject, is in this wise.

The whole station, outside cantonment limits, is divided, for conservancy purposes, into 4 circles ; these are : (1) from Observatory hill to the Club ; (2) from the Club down the cart road to Sunny Bank, including all houses below the upper forest road ; (3) from the Club to Pinnacle hill, including all houses on the other side of the upper forest road ; (4), the native bazár and washerman's settlement.

Over each of these circles there is an European overseer, and one Member of the Municipal Committee is in charge of each circle, while a general supervision is exercised by the Secretary to the Municipal Committee. Apart from the establishment allotted to the native bazár, the number of sweepers assigned to each of the other circles is regulated by the number of residents, and one of them is nominated as jamadár or gang master for each circle. Of the total strength of 80 sweepers, however, 7 are employed at the filth pits, and 4 on the public latrines, of which 3 are situated in the native bazár, and the fourth at Sunny Bank.

The above establishment is entertained during the summer months from 1st April to 30th November. During the winter months its strength is reduced to 1 European overseer, 1 jamadár and 20 sweepers.

The privy soil from European bungalows and their servants' latrines is removed daily by the Municipal sweepers in iron buckets and iron covered hand-barrows, provided for the purpose by the Municipality, and buried in filth pots. The hand-barrows are boxes of sheet iron about 2½ feet square and 1½ feet deep. They are fitted with a pole on either side, and the ends of these are furnished with a strap by which the box is slung on the shoulders of the carriers. The filth pits are situated far down on both slopes of the hill at a distance of from 1,500 to 2,000 yards from the population, and are dug lengthwise in the form of trenches, which, when filled, are covered with earth by the sweeper posted at each pit for the purpose. There are about 100 trenches at each place, and they are visited by the members of the Municipal Committee to whose circle they belong, and also the Secretary to the Municipal Committee. Or, at least, they are supposed to be.

All the houses in the Civil station are provided with night or privy soil buckets of iron, which are supplied by the Municipality. No means have been found for utilizing this filth as manure owing to the prejudices of the hill people, who refuse to take it even as a gift.

These are the arrangements which have been recently made for the conservancy of the station in consequence of the Civil Surgeon's representations of its very insanitary and filthy condition. They have not yet been put to the test of practical experience, and I confess I do not see much chance of their proving successful owing to the fault of divided authority.

A system similar in its main features to the one above described, but under the management of a single responsible officer was first established in May 1866 by the Deputy Commissioner (Major Hall), and for several years answered remarkably well under the vigorous and creditable management of the then conservancy overseer Mr. Dean, as described by Dr. DeRenzy in his Sanitary Report for 1869, in which he states:—" None of the Punjab sanitaria can compare with Marri as regards surface cleanliness ; and the hill sides and water-courses, though not entirely, are yet very fairly free of fœcal accumulations and other impurities. " Under this system it was the custom also for the conservancy establishment, at the close of every season, to collect and burn all filth and stable litter not required for use as manure. It does not appear why the system thus introduced and worked so successfully has not been maintained.

Recommends the appointment of an European overseer for the management of the conservancy arrangements of the station.

16. I would strongly recommend the advisability of reverting to the system originally introduced by Colonel Hall when Deputy Commissioner of this district, since it has been proved by practical test during several years to have answered so very satisfactorily. I think the appointment of an active, energetic and intelligent European overseer permanently engaged, and trusted with the entire management of the conservancy of the whole station as his sole and responsible duty, promises far more success than the employment of 4 new hands every year, who can neither take the same interest in the work nor acquire the same local knowledge and experience as it would be the pride of a permanent incumbent to do.

Instead of the present establishment I would recommend the following, namely—

1	European Conservancy overseer	@ Rs. 80	a month	...	Rs. 80
4	Jamadár sweepers	@ Rs. 10	each a month	...	„ 40
80	Sweepers	@ Rs. 6	„	...	„ 480
1	European Food Inspector	@ Rs. 20	„	...	„ 20
			Total monthly cost	...	Rs. 620

For winter months the establishment might be reduced to—

1	European conservancy overseer	@ Rs. 80	a month	...	Rs. 80
1	Jamadár sweeper	@ Rs. 10		...	„ 10
20	Sweepers	@ Rs. 60	each	...	„ 120
			Total monthly cost		Rs. 210

This would allow the distribution for the season's work of one jamadár and 20 sweepers to each of the 4 circles. During the winter season the 20 sweepers might be distributed as found convenient between the bazár and station. With such an establishment the overseer, aided by his 4 *jamadárs*, should find no difficulty in restoring the conservancy of the sanitarium to the satisfactory condition it was pronounced to be in when managed and worked by an energetic and intelligent man. At the close of the season the establishment, before being reduced for the winter, should collect and burn all litter and stable refuse in the several compounds all over the station.

Water-supply.

17. The water-supply of Marri is from springs, which are numerous on the hill, and generally issue on the surface at a considerable distance below the crest. They are mostly found on the western slope and usually in the natural drainage channels on the surface of the hill. They are dependent on the rain-fall, and during the dry months the greater number of them run dry, thus indicating that their source is from depressions in the rock not far below the surface.

Owing to the geological formation of the hill the water is naturally more or less hard. Dr. DeRenzy in his Sanitary Report for 1869 states that he " found the total hardness of different specimens to vary from 12° to 14,° the permanent hardness being 5°1. From Dr Center's analysis it appears to contain about 12 grains of lime salts, and 5 grains of salt of magnesia per gallon. Tested with chloride of barium, it gives a dense opalescence, showing the presence of sulphates in moderate quantity. As the organic constituents are continually changing from the conditions already described (surface impurities of the soil) no single analysis is of much use in determining the hygienic value of the water."

The liability of the drinking water of the station to contamination from admixture with surface drainage and in other ways, as from the feet of the water drawers, from their leather buckets, &c., owing to the springs being unprotected at the sites where they issue on the surface, has long been recognized, and various measures have been adopted from time to time to remedy this evil. At the present time all the public springs are protected at their issues, and several of the larger ones are provided with covered reservoirs into which the water is received, and whence it is drawn through a stop-cock or else by a hand-pump. These arrangements suffice to protect the water from contamination by the feet and hands of the drawers, and it is about all that the circumstances of the case allow of; for, owing to the gathering ground of the springs being every where covered by the houses of the station, it is impossible to protect them from contamination with surface impurities carried into the soil by percolation. Some idea of the nature of these impurities may be found when we consider that, however perfect may be the arrangements for keeping the surface clear of solid fœcal matters and other filth and refuse, they in no way whatever deal with urine and household slops, such as scullery and bath-room water, cow-shed and stable drainage, &c.

It has been proposed to purify the water by passing it through a filter-bed where it issues on the surface before collecting it in the reservoirs built at the several springs, but I am not aware that any steps have been taken to give practical effect to the proposal. I understand that a project for an improved water-supply for the station is under consideration of the Municipal Committee, but no details of the scheme have been communicated to this office.

Apart from the circumstances affecting the quality of the Marri station water, there are others affecting its quantity which have forced this subject upon the serious attention of the Municipal authorities, since much distress and inconvenience are experienced owing to the scarcity of water on the hill in seasons of drought, when, as before stated, most of the springs run dry.

The number of springs within Municipal limits which are used by the population for drawing water from are 12. They are the following according to the list furnished to me by the Secretary to the Municipal Committee:—

1. The spring near Sirdár Nihál Singh's house.
2. The " Bhishtí Ghát " spring.
3. The " Peachwood " spring.
4. } Two springs near the old cemetery.
5. }
6. The " Frankville " spring. } both near Sunny Bank.
7. The " Belmont " spring. }
8. The " Ellerslie " spring below the Court House.
9. The " Lawrence Asylum " spring and tank.
10. The " Goorkha Lines " do. do.
11. The " Convent " do. do.
12. The " Old Kashmíri Muhalla" do. do.

There are besides these 3 pools or tanks for watering cattle and gardens. They are filled from the surface drainage. Of the springs, Nos. 6, 8, 9, 10 11 and 12 are described as perennial; the others are said to run dry in seasons of drought, that is, the dry months preceding the monsoon rains. " All the drinking water tanks, " the Municipal Secretary states, " are roofed over, but the pools are not covered."

The unsatisfactory condition of the water-supply at Marri has for many years engaged the attention of the Local Government and the Municipal Committee, but the difficulties of the situation have hitherto proved insuperable, and little has been done beyond providing means for the protection of the water from the ordinary sources of contamination at the several spots where the springs issue on the surface.

" On the 6th July 1870, the Superintending Engineer 1st Circle was directed to submit a comprehensive scheme for improving the water-supply of Marri." (See Sanitary Report, Punjab, 1870)

In his report that officer states—

> 2. " The Sanitary Commissioner of the Punjab places the requirements of the case as follows :—
>
> *1st.*—That the water shall be taken from a pure source.
>
> *2nd.*—That it shall be plentiful.
>
> *3rd.*—That it should be so conveniently distributed that people be under no temptation to use water liable to pollution."

"3. After examination of the hill on which the above sanitarium is constructed, Superintending Engineer has come to the conclusion, it is not expedient to attempt supply from one or two points." Some suitable sites for large reservoirs are next indicated, but they are found objectionable, either owing to the gathering grounds being covered with houses, or being too far distant. "The requirements of the case," the Superintending Engineer concludes, "can be best met by a combination of methods," and he suggests the construction of reservoirs at the several known springs for the collection and storage of the water which now runs off on the melting of the winter's snow before the visitors arrive for each season's residence, by which means about one month's supply would be obtained to relieve the distress experienced in seasons of drought. In combination with this system, the Superintending Engineer "thinks the rain-fall collected from the roofs of houses (the only clean gathering ground available within reasonable limits) should certainly be stored, and he looks to this source to supply what is requisite to make up the deficiency in the present water-supply." The measure, the Superintending Engineer says, would be easy of application to Government buildings, and he suggests the Municipal Commissioners being requested to consider to what extent they could co-operate with a view to the general introduction of the same system. If the storage of water at the public sources be undertaken at the expense of the State to secure the population against distress and inconvenience in periods of drought, Superintending Engineer cannot but contemplate a hearty response on the part of house proprietors to the collection of pure water on the premises owned by them."

"8. The extent to which house proprietors will co-operate can be readily determined ; if action be general it will most probably be practicable to enclose those reservoirs fed from surface drainage with a view to the contents not being utilized, save under very exceptional circumstances."

"9. The position of Murree (Marri) is such that no reasonable scheme of water-supply can be devised which is not mainly dependent on rain-fall ; and no other scheme would meet so generally the third condition referred to in para. 2 of this letter."

No action seems to have been taken upon these very simple and practicable suggestions made in 1870 by the Superintending Engineer 1st Circle, and the loss of pure water which might be saved and stored to the entire removal of the distress and inconvenience experienced every season during the dry months is allowed to go on without an attempt to remedy the evil.

On the 10th May 1877 (page 71, Sanitary Report, 1877) a Sub-Committee of the Marri Municipal Committee made a report on the water-supply of the station with suggestions for the improvement of the condition of the existing public springs, but no comprehensive scheme was proposed, though in the concluding para. of a postscript to the report it is stated—

"The only way in which a supply of pure water can be secured is by storing in tanks rain water from the roofs of houses. It is believed that this can be done at no great expense. This proposal is strongly recommended by the Municipal Committee. House proprietors by carrying it out would greatly enhance the value of their property and make Murree (Marri) eventually a more healthy and more popular sanitarium."

Nothing has yet been done in the matter. I entirely concur in the propriety of the combined methods of water-supply for Marri suggested by the Superintending Engineer 1st Circle in 1870. The scheme alluded to by Mr. Wynne, in his Memorandum given on a preceding page, is, I consider, too costly to be undertaken by the Municipality, and has other defects which are indicated in the Memorandum. I would suggest that the Municipal Committee be requested to take this subject into consideration at an early date, with the view to giving practical effect to the measures indicated ; the combined methods should be the basis of any scheme of water-supply approved and adopted by the Municipal Committee.

The construction of covered storage reservoirs with filter-beds attached at each of the public springs, and of covered tanks for rain water from the roofs of public buildings in the station, such as the Church, Court House, Police Station, &c., appears to me a far more practicable and convenient arrangement than that of boring the hill far down its western slope. It could also, for collecting rain water, be extended into the cantonments where the roof area of the barracks would afford an extensive gathering ground.

This combined arrangement recommends itself to me as the only one practicable under the circumstances of the situation, and at the same time as most safely and conveniently meeting the requirements of the station. I think also it will be found the most economical for the results aimed at.

Efficient system of conservancy and water-supply, the two great and urgent requirements of this sanitarium.

18. The two great and most urgent requirements of this sanitarium at the present time are an efficient system of conservancy and efficient system of water-supply, and both are attainable without much difficulty if the Municipal Commissioners will only set about the work in earnest.

Much may be done to improve the salubrity of the station by a more systematic and efficient working of the conservancy establishment, and their labors would be considerably lightened and facilitated by the entire management of the sweeper staff being committed to the charge of a single responsible officer, as was found to work so successfully in previous years when Colonel Hall was Deputy Commissioner. I would strongly recommend a reversion to that system. But this alone is not sufficient. The most perfect organization of the sweeper staff will not suffice to remove the evils arising from a faulty sewerage system and defective latrine accommodation. These faults and defects have been indicated in the preceding pages of this report. The only remedy here is the reconstruction and repair of the faulty and defective structures.

In the native bazár the old drains require to be removed and replaced by surface gutters on each side of the roadway, which itself requires to be remetalled and convexed. The public latrines, of which there are 4, namely, 3 in the native bazár and 1 at Sunny Bank, all require to be roofed and re-floored with dressed stone flags, and furnished with the requisite utensils and appliances for the service of the latrine, as already indicated. The cost of all these works, reservoirs and filter-beds at the springs, tanks for rain water, bazár drainage and latrine repairs, will be considerable. It would probably be most economical to have them executed as parts of one and the same work by an experienced Engineer officer.

There is no information in this office as to the amount of the annual income of the Marri Municipality, nor of the sources whence it is derived. Nor are there any details available of the claims upon it for current expenditure. But it appears to me that the cost of the works above proposed would not be so great as to be beyond the means of the Municipality to meet, by means of a loan to be paid off in a series of years. The works are of special urgency ; their cost should be treated as an extraordinary charge, and should be met by some special measures of local taxation.

I have so far dealt with only the conservancy and water-supply requirements of the station ; but there is another of equally grave importance, namely, food-supply. This subject has been prominently noticed by

Dr. Roe in his letter before alluded to, and I have reserved its mention till now, as I consider it requires very special attention.

Food-supply.

19. From Dr. Roe's account, it appears that the food-supply of Marri is as bad and neglected as its conservancy arrangements and water-supply. He says—

"I have carefully examined many samples of milk from various dealers since my arrival here, and I am in a position to assert that, with perhaps half-a-dozen exceptions, not a single specimen of perfectly pure milk has come before me from these milk-sellers ; some specimens were largely diluted with dirty water (30 to 40 per cent. being quite common) ; others were putrid from the presence of some organic substance present in the specimen, rendering it perfectly stinking ; some were highly acid, others as strongly alkaline, showing that either something had been added to the milk, or the animal from which it was taken was diseased," or, it may be added, that the milk itself was brought to market when stale or in a state of decomposition. However, Dr. Roe continues—" on the 12th June I examined 9 samples of milk taken from the vessels of villagers bringing it in for sale into the bazár, and the average percentage of water in them was from 75 to 80 " (the percentage ranged from 75 to 80 ?) " and after allowing the milk to stand for 24 hours in a tall test glass, I found under the microscope the dirt, sand, bits of sticks, and other deposits from the dirty water which had been used."

"In the matter of grain, as in everything else, adulteration is extensively practised, wheat, indian corn, old and musty, ground up and mixed with dirt of all kinds to increase weight ; in fact every attempt made to sell the worst possible article at the highest rate."

In consequence of Dr. Roe's representations, the Municipal Committee have appointed a European Food Inspector on Rs. 25 a month. I understand that the incumbent will be appointed every season from amongst the soldiers in the Military Depôt, and I presume it is intended also that he should inspect the cattle brought for slaughter. It would be advisable, I think, that the Members of the Municipal Committee should take it in turn to inspect the bazár supplies at frequent and unfixed intervals during the season. For there is no doubt that much of the sickness experienced here every season is caused by the use as food of unripe or decayed vegetables and fruit, more so than of any other article of diet.

But the inspection to be of any use must be thorough and sustained ; and a few severe examples of delinquents will be necessary to put a stop to this nefarious and hitherto unchecked custom of selling adulterated and bad articles of food.

VITAL STATISTICS

OF THE

GENERAL POPULATION, 1880.

ANNUAL FORM No. I.

BIRTHS REGISTERED in the DISTRICTS of the PUNJAB during the year 1880.

1	2	3	4			5			6	7	8
			Number of births registered.			*Ratio of births per 1,000 of population.*					
Number.	Districts.	Population according to Census of 1868.	Males.	Females.	Total.	Males.	Females.	Total.	Number of males born to every 100 females born.	Excess of births over deaths per 1,000 of population.	Excess of deaths over births per 1,000 of population.
	DELHI DIVISION.										
1	Delhi	608,850	10,341	8,793	19,134	16·98	14·44	31·43	117·60	...	3
2	Gurgaon	696,646	8,785	6,282	15,067	12·61	9·02	21 63	139·78	...	1
3	Karnál	610,927	10,484	8,583	19,067	17·16	14·05	31·21	122·15	...	7
	HISSAR DIVISION.										
4	Hissar	484,681	8,846	7,063	15,909	18·25	14 57	32·82	125·24	13	...
5	Rohtak	536,959	8,931	7,357	16,288	16·63	13·70	30·33	121·39	3	...
6	Sirsa	210,795	4,332	3,484	7,816	20·55	16·53	37·08	124·34	15	...
	UMBALLA DIVISION.										
7	Umballa	1,008,860	15,568	12,765	28,333	15·43	12·65	28·08	121·96	...	2
8	Ludhiána	583,245	10,979	9,245	20,224	18·82	15·85	34·67	118·76	9	...
9	Simla	33,594	232	164	396	6·90	4·88	11·79	141·46	...	12
	JULLUNDUR DIVISION.										
10	Jullundur	783,020	14,471	12,733	27,204	18·48	16·26	34·74	113·65	10	...
11	Hoshiárpur	938,890	14,270	12,571	26,841	15·20	13·39	28·59	113·51	...	...
12	Kángra	743,758	7,839	6,908	14,747	10·54	9·29	19 83	113·48	...	14
	AMRITSAR DIVISION.										
13	Amritsar...	832,750	18,233	15,843	34,076	21·89	19·02	40 92	115·08	12	...
14	Gurdáspur	906,126	14,136	12,230	26,366	15·60	13·50	29·10	115·58	1	...
15	Siálkot	994,458	19,879	16,834	36,713	19·99	16·93	36·92	118·09	14	...
	LAHORE DIVISION.										
16	Lahore	775,551	19,065	16,259	35,324	24·58	20·96	45·55	117·26	14	...
17	Gujránwála	550,576	11,435	9,619	21,054	20·77	17·47	38·24	118·88	11	...
18	Ferozepore	533,416	12,474	10,581	23,055	23·38	19·84	43·22	117·89	20	...
	RAWALPINDI DIVN.										
19	Rawalpindi	699,647	9,787	7,759	17,546	13·99	11·09	25·08	126·14	...	7
20	Jhelum	500,988	8,760	7,334	16,094	17·48	14·64	32·12	119·44	4	...
21	Gujrat	616,347	13,750	11,422	25,172	22·31	18·53	40·84	120·38	11	...
22	Shahpur	368,796	7,866	6,650	14,516	21·33	18·03	39·36	118·28	8	...
	MOOLTAN DIVISION.										
23	Mooltan	459,765	8,531	6,814	15,345	18·55	14·82	33·37	125·20	8	...
24	Jhang	348,027	6,066	4,929	10,995	17·43	14·16	31·59	123·08	12	...
25	Montgomery	359,437	6,260	5,445	11,705	17·42	15·14	32·56	114·97	12	...
26	Muzaffargarh	295,547	5,900	4,586	10,486	19·96	15·52	35·48	128·65	6	...
	DERAJAT DIVISION.										
27	D. I. Khan	394,864	5,517	3,849	9,366	13·97	9·75	23·72	143·33	...	2
28	D. G. Khan	309,978	4,649	3,321	7,970	15·00	10·71	25·71	139·99	8	...
29	Bannu	287,547	3,760	2,505	6,265	13·08	8·71	21·79	150·10	...	5
	PESHAWAR DIVISION.										
30	Pesháwar...	500,443	2,825	1,553	4,378	5·64	3·10	8·75	181·90	...	9
31	Hazára	367,218	3,100	2,300	5,400	8·44	6·26	14·70	134·78	...	1
32	Kohát	145,419	1,158	649	1,807	7·96	4·46	12·43	178·43	...	6
	Total ...	17,487,125	298,229	246,430	544,659	17·05	14·09	31·15	121·02	4	...

ANNUAL FORM No. II.

DEATHS REGISTERED in the DISTRICTS of the PUNJAB during the year 1880.

1	2	3	4	5	6			7	8			9		
Number.	DISTRICTS.	Population according to census of 1868.	Area in square miles.	Average population per square mile.	*Number of deaths registered*			No. of males died to every 100 deaths of females.	*Ratio of deaths per 1,000 of population*			*Mean ratio of deaths per 1,000 during previous 5 years.*		
					Males.	Females.	Total.		Males.	Females.	Total.	Males.	Females.	Total.
	DELHI DIVISION.													
1	Delhi	608,850	* 1,258	496	11,445	9,103	20,548	125·73	35	32	34	41	42	41
2	Gurgoon	696,646	1,938	348	9,475	6,896	16,371	137·14	25	21	23	44	42	43
3	Karnál	610,927	2,396	264	13,172	10,047	23,219	131·10	40	36	38	34	32	33
	HISSAR DIVISION.													
4	Hissar	484,681	3,540	137	5,574	4,283	9,857	130·40	21	20	20	22	22	22
5	Rohtak	536,959	1,811	295	8,567	6,026	14,593	142·17	29	25	27	32	32	32
6	Sirsa	210,795	3,116	68	2,597	2,015	4,612	128·89	22	21	22	24	25	25
	UMBALLA DIVISION.													
7	Umballa	1,008,860	2,570	394	17,219	13,204	30,423	130·41	31	29	30	28	26	27
8	Ludhiána	583,245	1,375	429	8,326	7,077	15,403	117·65	26	27	26	31	31	31
9	Simla	33,594	18	1,888	453	344	797	131·69	20	30	24	20	22	21
	JULLUNDUR DIVN.													
10	Jullundur -	783,020	1,322	596	10,731	9,024	19,755	118·92	25	25	25	42	47	44
11	Hoshiárpur	938,890	2,180	450	14,243	12,265	26,508	116·13	28	28	28	36	37	37
12	Kángra	743,758	8,389	87	13,560	11,712	25,272	115·78	34	33	34	26	24	25
	AMRITSAR DIVISION													
13	Amritsar	832,750	1,573	535	12,941	10,973	23,914	117·93	28	30	29	37	39	38
14	Gurdáspur	906,126	1,822	496	13,671	11,502	25,173	118·86	27	28	28	33	33	32
15	Siálkot	994,458	1,958	510	12,501	10,084	22,585	123·97	23	22	23	27	26	26
	LAHORE DIVISION.													
16	Lahore	775,551	3,648	218	13,345	10,689	24,034	124·85	31	31	31	36	36	36
17	Gujránwála	550,576	2,587	207	8,050	6,805	14,855	118·29	26	28	27	31	33	32
18	Ferozepore	533,416	2,744	204	6,976	5,402	12,378	129·14	24	22	23	26	24	25
	RAWALPINDI DIVISION.													
19	Rawalpindi	699,647	6,218	114	12,713	9,826	22,539	129·38	34	30	32	33	32	33
20	Jhelum	500,988	3,910	128	7,737	6,327	14,064	122·28	29	27	28	27	26	27
21	Gujrát	616,347	1,973	324	10,180	8,495	18,675	119·83	31	30	30	24	23	24
22	Shahpur	368,796	4,691	78	6,134	5,311	11,445	115·50	31	31	31	27	25	26
	MOOLTAN DIVISION.													
23	Mooltan	459,765	5,880	80	6,529	5,163	11,692	126·46	26	25	25	27	25	26
24	Jhang	348,027	5,702	61	3,744	2,762	6,506	135·55	19	18	19	14	14	14
25	Montgomery	359,437	5,574	64	4,005	3,235	7,240	123·80	20	20	20	25	25	25
26	Muzaffargarh	295,547	3,136	98	4,677	3,838	8,515	121·86	29	29	29	25	23	24
	DERAJAT DIVISION.													
27	Dera Ismail Khan	394,864	9,296	56	5,753	4,645	10,398	123·85	27	25	26	21	20	21
28	Dera Gházi Khan	309,978	4,377	118	3,274	2,348	5,622	139·44	19	17	18	16	14	15
29	Bannu	287,547	3,831	91	4,418	3,441	7,859	128·39	29	26	27	20	18	19
	PESHAWAR DIVN.													
30	Peshávar	500,443	2,504	271	5,274	3,978	9,252	132·58	20	17	18	18	16	18
31	Hazára	367,218	2,835	122	3,333	2,697	6,030	123·58	17	15	16	21	17	19
32	Kohát	145,419	2,838	52	1.561	1,036	2,597	150·67	20	16	18	13	10	12
	Total for the Province ...	17,487,125	107,010	173	262,178	210,553	472,731	124 52	27	26	27	30	29	29

* NOTE.—The figures in column 4 have been taken from the Punjab Administration Report for 1879-80.

ANNUAL FORM No. III.

DEATHS REGISTERED in the DISTRICTS of the PUNJAB during each month of the year 1880.

1	2	3												4	5
Number.	DISTRICTS.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total Deaths registered during the year.	Number.
	DELHI DIVISION.														
1	Delhi	2,767	1,746	1,541	1,351	1,729	1,800	1,184	1,289	1,432	1,708	1,951	2,050	20,548	1
2	Gurgaon	3,144	1,577	1,255	1,051	1,190	1,474	856	950	995	1,323	1,234	1,322	16,371	2
3	Karnál	2,983	1,888	1,614	1,630	1,655	1,945	1,364	1,632	2,095	2,195	1,984	2,234	23,219	3
	HISSAR DIVISION.														
4	Hissar	716	771	737	731	940	978	652	926	858	837	858	853	9,857	4
5	Rohtak	1,948	1,050	1,212	938	1,253	1,237	825	958	1,145	1,360	1,381	1,286	14,593	5
6	Sirsa	459	479	425	372	403	423	337	344	323	342	335	370	4,612	6
	UMBALLA DIVISION.														
7	Umballa	3,599	2,333	2,246	1,799	2,209	2,207	1,588	2,128	3,094	3,855	2,923	2,442	30,423	7
8	Ludhiána	1,240	803	845	969	824	1,074	890	1,253	2,227	2,058	1,734	1,486	15,403	8
9	Simla	58	57	54	47	82	64	72	71	90	84	58	60	797	9
	JULLUNDUR DIVISION.														
10	Jullundur	2,132	1,485	1,433	1,286	1,324	1,232	1,086	1,539	2,151	2,159	1,980	1,948	19,755	10
11	Hoshiárpur	2,458	1,873	1,677	1,502	1,609	1,904	1,227	1,896	3,756	3,221	2,808	2,577	26,508	11
12	Kángra	1,844	1,745	1,778	1,535	2,137	2,201	1,585	2,112	3,319	2,820	2,139	2,057	25,272	12
	AMRITSAR DIVISION.														
13	Amritsar	1,813	1,427	1,410	1,336	1,634	1,835	1,465	2,030	2,619	2,830	2,858	2,657	23,914	13
14	Gurdáspur	2,543	1,892	1,416	1,197	1,680	1,750	1,441	1,914	3,048	3,513	2,469	2,310	25,173	14
15	Siálkot	1,712	1,304	1,299	1,148	1,455	1,571	1,370	1,975	3,019	3,041	2,524	2,167	22,585	15
	LAHORE DIVISION.														
16	Lahore	2,092	1,709	1,421	1,355	1,732	1,755	1,562	2,098	2,408	2,435	2,631	2,836	24,034	16
17	Gujránwála	1,202	942	902	816	1,065	1,274	1,133	1,477	1,567	1,497	1,435	1,545	14,855	17
18	Ferozepore	762	799	952	771	732	930	717	1,063	1,285	1,603	1,489	1,275	12,378	18
	RAWALPINDI DIVISION.														
19	Rawalpindi	2,780	2,029	1,529	1,244	1,415	1,503	1,368	1,694	1,943	2,293	2,287	2,454	22,539	19
20	Jhelum	1,254	1,103	1,015	826	966	1,185	962	1,233	1,366	1,496	1,278	1,380	14,064	20
21	Gujrat	1,494	1,409	1,238	1,254	1,684	1,476	1,463	1,486	1,890	2,140	1,700	1,441	18,675	21
22	Shahpur	988	1,038	1,048	1,170	1,026	1,182	905	863	774	862	683	906	11,445	22
	MOOLTAN DIVISION.														
23	Mooltan	1,218	1,044	890	784	1,032	757	830	740	791	1,135	1,048	1,423	11,692	23
24	Jhang	406	610	594	448	565	586	541	557	492	480	543	684	6,506	24
25	Montgomery	739	639	533	408	582	537	451	601	553	661	726	810	7,240	25
26	Muzaffargarh	725	746	858	644	689	615	431	436	657	764	897	1,053	8,515	26
	DERAJAT DIVISION.														
27	Dera Ismail Khan	1,083	866	824	747	1,103	1,006	836	696	622	787	843	985	10,398	27
28	Dera Gházi Khan	651	650	524	451	501	374	410	366	383	401	436	475	5,622	28
29	Bannu	652	615	677	550	610	623	560	513	527	747	793	992	7,859	29
	PESHAWAR DIVISION.														
30	Peshâwar	933	691	610	526	655	580	560	517	698	1,137	1,136	1,209	9,252	30
31	Hazára	566	443	356	362	536	447	408	475	539	683	530	685	6,030	31
32	Kohát	231	282	170	136	145	183	198	157	202	247	317	329	2,597	32
	Total for the Province.	47,192	36,045	33,083	29,384	35,162	36,708	29,277	35,989	46,868	50,714	46,008	46,301	472,731	
	Ratio of deaths per 1,000 in each month ..	2·70	2·06	1·89	1·68	2·01	2·10	1·67	2·06	2·68	2·90	2·63	2·65	27·03	

DEATHS REGISTERED according to age in the DISTRICTS of the

1	2	3		4		5		5	
Number.	Districts.	*Under one year.*		*One year and under 6*		6 *and under* 12.		12 *and under* 20.	
		Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.
	DELHI DIVISION.								
1	Delhi	1,706	1,256	1,335	1,089	475	394	455	356
2	Gurgaon	1,035	715	850	583	474	344	458	333
3	Karnál	2,249	1,662	1,662	1,229	518	410	547	353
	HISSAR DIVISION.								
4	Hissar	1,180	879	850	663	254	207	221	163
5	Rohtak	1,542	1,130	1,000	746	417	310	394	225
6	Sirsa	626	500	373	337	116	105	90	74
	UMBALLA DIVISION.								
7	Umballa	2,972	2,463	2,175	1,635	690	622	673	452
8	Ludhiána	2,234	2,111	1,433	1,233	370	288	289	267
9	Simla	63	62	34	39	13	13	19	24
	JULLUNDUR DIVISION.								
10	Jullundur	2,418	2,300	1,503	1,425	602	509	415	351
11	Hoshiárpur	2,941	2,752	2,026	2,090	720	717	574	479
12	Kángra	1,942	1,662	1,770	1,779	754	790	741	718
	AMRITSAR DIVISION.								
13	Amritsar	3,838	3,671	2,080	1,955	580	449	398	459
14	Gurdáspur	2,846	2,412	2,156	2,114	724	662	609	422
15	Siálkot	3,443	2,832	2,368	2,075	535	438	367	344
	LAHORE DIVISION.								
16	Lahore	3,818	3,432	2,362	2,112	456	407	420	434
17	Gujránwála	2,153	1,929	1,678	1,476	366	272	214	190
18	Ferozepore	2,061	1,870	1,164	905	336	257	267	217
	RAWALPINDI DIVISION.								
19	Rawalpindi	2,104	1,683	1,911	1,689	675	567	556	452
20	Jhelum	1,665	1,439	1,611	1,341	449	389	285	214
21	Gujrat	2,372	1,911	3,008	2,705	567	464	274	178
22	Shahpur	1,781	1,443	1,741	1,536	406	409	149	136
	MOOLTAN DIVISION.								
23	Mooltan	1,579	1,327	632	534	229	209	224	199
24	Jhang	971	832	506	400	166	139	97	76
25	Montgomery	1,027	1,003	556	449	168	138	147	117
26	Muzaffargarh	1,068	859	690	620	284	250	181	158
	DERAJAT DIVISION.								
27	Dera Ismail Khan	1,119	873	1,194	1,088	453	356	222	154
28	Dera Gházi Khan	602	453	444	324	226	177	149	106
29	Bannu	827	580	1,052	1,001	360	287	194	120
	PESHAWAR DIVISION.								
30	Pesháwar	451	341	770	711	308	261	220	178
31	Hazára	290	225	412	331	221	173	199	154
32	Kohát	158	131	211	218	84	62	65	61
	Total for the Province ...	55,081	46,738	41,557	36,432	12,996	11,075	10,113	8,164
	Ratio per 1,000 living ...	5·79	5·86	4·37	4·57	1 37	1·39	1·06	1·02

PUNJAB during the year 1880.

7		8		9		10		11		12
20 and under 30.		*30 and under* 40.		*40 and under* 50.		*50 and under* 60.		60 *and upwards.*		
Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Number.
1,038	851	1,090	974	1,457	1,047	1,492	1,053	2,397	2,083	1
1,174	791	1,024	879	1,204	875	1,414	920	1,842	1,456	2
1,211	994	1,318	1,053	1,628	1,238	1,574	1,047	2,465	2,061	3
450	373	422	376	591	388	605	345	1,001	889	4
810	547	737	597	976	611	1,126	669	1,565	1,191	5
195	189	203	149	263	158	268	127	463	376	6
1,386	1,126	1,612	1,228	2,058	1,405	1,982	1,364	3,671	2,909	7
504	481	517	417	655	536	720	551	1,604	1,193	8
45	40	59	35	81	42	64	30	75	59	9
673	597	817	715	1,136	797	1,143	738	2,024	1,592	10
979	927	1,240	992	1,457	965	1,411	906	2,895	2,437	11
1,320	1,519	1,153	991	1,699	1,052	1,343	881	2,838	2,320	12
818	836	871	618	1,071	650	1,086	636	2,199	1,699	13
1,083	986	1,101	942	1,570	1,086	1,251	821	2,331	2,057	14
654	591	726	603	948	661	896	535	2,564	2,005	15
784	654	907	580	1,104	661	1,102	668	2,392	1,741	16
285	352	375	300	529	416	627	423	1,823	1,447	17
425	366	409	322	491	330	587	318	1,236	817	18
1,055	756	1,256	983	1,341	986	1,179	790	2,636	1,920	19
405	379	516	411	604	417	613	358	1,589	1,379	20
431	418	407	372	580	439	592	430	1,949	1,578	21
149	173	170	174	258	251	321	226	1,159	963	22
390	406	541	461	766	542	681	364	1,487	1,121	23
135	110	205	158	289	211	342	212	1,033	624	24
213	195	193	190	345	243	374	217	982	683	25
273	316	398	324	520	361	368	266	895	684	26
352	264	390	322	470	406	486	306	1,067	876	27
196	195	299	250	368	253	346	163	644	427	28
269	165	313	231	378	302	353	243	672	512	29
446	323	651	479	758	549	551	352	1,119	784	30
290	305	374	345	442	358	311	219	794	587	31
207	94	238	107	194	134	164	68	240	161	32
18,645	16,319	20,532	16,578	26,231	18,370	25,372	16,246	51,651	40,631	
1·96	2·04	2·16	2·08	2·76	2·30	2·67	2·04	5·43	5·09	

ANNUAL FORM No. V.

DEATHS REGISTERED according to CLASSES in the DISTRICTS of the PUNJAB during the year 1880.

1	2	3					4					5				
Number.	Districts.	Population according to Census of 1868.					Number of deaths registered.					Ratio of deaths per 1,000 of population.				
		Muhammadans.	Hindus.	Native Christains.	Other castes.	Total.	Muhammadans.	Hindus.	Native Christians.	Other castes.	Total.	Muhammadans.	Hindus.	Native Christians.	Other castes.	Total.
	DELHI DIVISION.															
1	Delhi ...						4,867	13,497	12	2,172	20,548					
2	Gurgaon ...						4,761	9,295	1	2,314	16,371					
3	Karnál ...						5,711	14,333	1	3,174	23,219					
	HISSAR DIVISION.															
4	Hissar ...						2,096	6,525	...	1,236	9,857					
5	Rohtak ...						1,881	10,856	1	1,855	14,593					
6	Sirsa ...						1,695	2,272	...	645	4,612					
	UMBALLA DIVISION.															
7	Umballa ...						8,892	16,949	...	4,582	30,423					
8	Ludhiána ...						5,913	7,791	...	1,699	15,403					
9	Simla ...						180	406	...	211	797					
	JULLUNDUR DIVISION.															
10	Jullundur ...						9,334	7,604	...	2,817	19,755					
11	Hoshiárpur ...						8,892	14,221	...	3,395	26,508					
12	Kángra ...						1,500	20,547	3	3,222	25,272					
	AMRITSAR DIVISION.															
13	Amritsar ...	Information not available.					11,460	10,204	1	2,249	23,914	Information not available.				
14	Gurdáspur ...						11,846	10,416	2	2,909	25,173					
15	Siálkot ...						14,061	6,332	...	2,192	22,585					
	LAHORE DIVISION.															
16	Lahore ...						15,262	6,638	7	2,127	24,034					
17	Gujránwála. ...						10,310	3,572	...	973	14,855					
18	Ferozepore ...						5,905	5,066	1	1,406	12,378					
	RAWALPINDI DIVISION.															
19	Rawalpindi ...						20,103	2,350	1	85	22,539					
20	Jhelum ...						12,279	1,708	1	76	14,064					
21	Gujrat ...						16,482	2,099	...	94	18,675					
22	Shahpur ...						9,594	1,720	...	131	11,445					
	MOOLTAN DIVISION.															
23	Mooltan ...						9,156	2,369	2	165	11,692					
24	Jhang ...						4,924	1,378	...	204	6,506					
25	Montgomery ...						5,171	1,764	...	305	7,240					
26	Muzaffargarh ...						7,363	1,083	...	69	8,515					
	DERAJAT DIVISION.															
27	Dera Ismail Khan ...						8,994	1,327	...	77	10,398					
28	Dera Ghází Khan ...						4,718	858	...	46	5,622					
29	Bannu ...						6,996	821	1	41	7,859					
	PESHAWAR DIVISION.															
30	Peshúwar ...						8,597	569	...	86	9,252					
31	Hazára ...						5,610	411	1	8	6,030					
32	Kohát ...						2,317	227	...	53	2,597					
	Total ...						246,870	185,208	35	40,618	472,731					

DEATHS REGISTERED from different CAUSES in the DISTRICTS

1	2	3	4	5	6	7	INJU	
							Suicide.	
Number.	A. DISTRICTS.	Population according to Census of 1868.	Cholera.	Small-pox.	Fevers.	Bowel complaints.	Males.	Females.
	DELHI DIVISION.							
1	Delhi ...	434,660	2	...	11,040	678	4	4
2	Gurgaon ...	636,779	2	11	12,489	453	19	45
3	Karnál ...	546,613	...	432	15,942	530	3	5
	HISSAR DIVISION.							
4	Hissar ...	425,089	1	16	6,383	177	3	...
5	Rohtak ...	509,509	3	8	11,301	271	3	6
6	Sirsa ...	197,988	2	24	2,979	135	1	2
	UMBALLA DIVISION.							
7	Umballa ...	936,992	5	431	21,043	1,543	5	3
8	Ludhiána ...	526,539	2	39	9,371	387	3	3
9	Simla ...	16,154	1	...	161	125	...	...
	JULLUNDUR DIVISION.							
10	Jullundur ...	708,129	...	207	13,554	215	4	2
11	Hoshiárpur ...	911,781	1	368	17,725	1,440	7	9
12	Kángra ...	740,896	2	29	15,386	2,957	13	17
	AMRITSAR DIVISION.							
13	Amritsar ...	696,584	2	49	12,082	437	11	10
14	Gurdáspur ...	876,942	6	93	17,712	1,159	3	1
15	Siálkot ...	961,469	1	21	15,049	707	2	5
	LAHORE DIVISION.							
16	Lahore ...	630,317	9	164	12,800	421	4	4
17	Gujránwála ...	514,868	1	63	10,116	376	9	2
18	Ferozepore ...	518,248	2	92	7,738	242	5	4
	RAWALPINDI DIVISION.							
19	Rawalpindi ...	670,906	23	101	17,678	857	...	2
20	Jhelum ...	474,272	6	163	9,196	799	1	2
21	Gujrát ...	584,932	7	21	11,400	569	5	5
22	Shahpur ...	354,086	1	799	4,916	578	1	1
	MOOLTAN DIVISION.							
23	Mooltan ...	408,887	...	203	7,369	136	3	1
24	Jhang ...	322,410	...	104	3,396	148	1	...
25	Montgomery ...	359,437	...	185	4,861	140	...	2
26	Muzaffargarh ...	295,547	1	855	6,221	86	3	1
	DERAJAT DIVISION.							
27	Dera Ismail Khan ...	369,579	...	1,953	6,188	181	2	3
28	Dera Ghází Khan ...	286,770	...	204	3,883	73	...	2
29	Bannu ...	284,323	3	1,558	4,719	353	2	...
	PESHAWAR DIVISION.							
30	Peshávar ...	440,049	49	397	5,316	167	...	...
31	Hazára ...	364,324	4	4	5,149	191	1	1
32	Kohát ...	129,166	...	239	1,578	53	...	...
	Total of Districts ...	16,134,245	136	8,833	304,741	16,634	118	142

NOTE—A. Districts in this Statement do not include and *TOWNS of the PUNJAB during the year* 1880.

8			9	10	11								12
RIES.					RATIO OF DEATHS PER 1,000 OF POPULATION.								
											From all causes.		
Wounding or accidents.	Snake bite or killed by wild beasts.	Total.	All other causes.	Total deaths from all causes.	Cholera.	Small-pox.	Fevers.	Bowel complaints.	Injuries.	All other causes.	For the year.	Mean of previous five years.	Number.
128	31	167	2,431	14,318	0·004	...	25·40	1·56	0·38	5·59	33	35	1
204	23	291	1,340	14,586	0·003	0·02	19·61	0·71	0·46	2·10	23	40	2
127	28	163	3,974	21,041	...	0·79	29·16	0·97	0·30	7·27	38	32	3
63	28	94	1,770	8,441	0·002	0·04	15·01	0·42	0·22	4·16	20	19	4
130	28	167	2,288	14,038	0·005	0 01	22·18	0·53	0·33	4·49	27	31	5
44	9	56	1,203	4,399	0·01	0·12	15·05	0·68	0·28	6·08	22	24	6
166	36	210	5,179	28,411	0·005	0·46	22·46	1·65	0·22	5·53	30	26	7
104	14	124	3,482	13,405	0·003	0·07	17·80	0·73	0·23	6·61	25	28	8
7	1	8	216	511	0·06	...	9·97	7·74	0·49	13·37	32	21	9
114	17	137	3,586	17,699	...	0·29	19·14	0·30	0·19	5·06	25	43	10
225	32	273	5,852	25,659	0·001	0·40	19·44	1·58	0·30	6·42	28	36	11
231	75	336	6,446	25,156	0·002	0·04	20·78	3·99	0·45	8·70	34	25	12
133	24	178	5,906	18,654	...	0·07	17·35	0·63	0·25	8·48	27	33	13
169	52	225	5,602	24,797	0·006	0·11	20·20	1·32	0·26	6·39	28	32	14
146	26	179	5,826	21,783	...	0·02	15·65	0·73	0·19	6·06	23	26	15
162	102	272	6,020	19,686	0·01	0·26	20·31	0·67	0·43	9·55	31	35	16
103	100	214	3,030	13,800	...	0·12	19·65	0 73	0·41	5 88	27	31	17
85	36	130	3,435	11,639	0·003	0·18	14·93	0·47	0·25	6·63	22	24	18
219	48	269	2,280	21,208	0·03	0·15	26·35	1·28	0·40	3·40	32	32	19
175	44	222	2,932	13,318	0·01	0·34	19·39	1·68	0·47	6·18	28	26	20
100	31	141	5,765	17,903	0·01	0·03	19·49	0·97	0·24	9·85	31	23	21
89	54	145	4,487	10,926	...	2·26	13·88	1·63	0·41	12·67	31	25	22
114	28	146	2,042	9,946	...	0·50	18·02	0·45	0·36	4·99	24	24	23
85	43	129	2,149	5,926	...	0·32	10·53	0·46	0·40	6·66	18	13	24
82	49	133	1,921	7,240	...	0·51	13·52	0·39	0·37	5·34	20	25	25
91	38	133	1,219	8,515	...	2 89	21·05	0·29	0·45	4·12	29	24	26
91	38	134	1,303	9,759	...	5·28	16·74	0·49	0·36	3·52	26	21	27
46	21	69	792	5,021	...	0·71	13·54	0·25	0·24	2·76	17	13	28
43	17	62	1,018	7,713	0·01	5 48	16 60	1·24	0·22	3·58	27	18	29
83	6	89	573	6,591	0·11	0·90	12·08	0·38	0·20	1·30	15	12	30
106	15	123	523	5,994	0·01	0·01	14·13	0·52	0·34	1·43	16	19	31
64	7	71	206	2,147	...	1·85	12·22	0·41	0·55	1·59	17	10	32
3,729	1,101	5,090	94,796	430,230	0·01	0·55	18·89	1·03	0·31	5·88	26·67	28	...

the population and deaths of the principal Towns, Cantonments and Hill Sanitaria.

DEATHS REGISTERED from different CAUSES in the

1	2	3	4	5	6	7		
							INJU	
							Suicide.	
Number.	B. TOWNS.	Population according to Census of 1875 and 1876.	Cholera.	Small-pox.	Fevers.	Bowel complaints.	Males.	Females.
	DELHI DISTRICT.							
1	Delhi	115,992	...	1	3,442	104	3	1
2	Do. Suburbs	44,561	...	...	874	41	...	...
3	Sonepat	13,637	...	...	221	20	...	...
	GURGAON DISTRICT.							
4	Farakhnagar	10,594	...	...	199	64	...	...
5	Rewári	25,190	...		362	108	...	...
6	Fírozpur	10,530	...	...	179	26	...	...
7	Palwal	13,553	...	...	207	89	...	...
	KARNAL DISTRICT.							
8	Karnál	24,015	...	19	493	135	...	...
9	Kaithal	15,799	...	...	211	56	...	...
10	Panipat	24,500	1	8	371	102	...	...
	HISSAR DISTRICT.							
11	Hissar	14,162	...	...	169	31	...	...
12	Hánsi	12,210	...	...	182	26	...	...
13	Bhiwáni	33,220	1	9	348	78	...	...
	ROHTAK DISTRICT.							
14	Rohtak	14,994	...	...	155	27	...	1
15	Jhajjar	12,456	...	1	132	38	...	...
	SIRSA DISTRICT.							
16	Sirsa	12,807	...	...	95	23	...	...
	UMBALLA DISTRICT.							
17	Umballa	26,258	...	2	376	166	...	...
18	Jagádhri	12,522	...	3	144	37	...	...
19	Shahabad	11,660	...	9	179	22	...	...
20	Sádhaura	11,167	...	2	195	1	...	...
21	Rúpar	10,261	1	1	132	20	...	...
	LUDHIANA DISTRICT.							
22	Ludhiána	40,385	1	5	864	97	...	...
23	Jagraon	16,321	...	...	154	85	...	1
	JULLUNDUR DISTRICT.							
24	Jullundur	35,222	...	...	520	84	...	...
25	Do. Suburbs	15,702	...	1	229	24	...	...
26	Kartárpur	11,053	...	1	204	2	...	...
27	Ráhon	12,914	...	...	330	60	...	...
	HOSHIARPUR DISTRICT.							
28	Hoshiárpur	13,138	...	...	145	98	...	1
29	Urmar Tánda	13,971	...	...	246	56	...	...
	AMRITSAR DISTRICT.							
30	Amritsar	136,166	1	1	2,539	417	2	4
	GURDASPUR DISTRICT.							
31	Batála	26,929	...	1	182	26	...	...
	SIALKOT DISTRICT.							
32	Siálkot	32,989	...	...	311	120	...	...
	LAHORE DISTRICT.							
33	Lahore	92,035	3	7	1,978	73	2	...
34	Do. Suburbs	36,406	1	...	572	197	2	1
35	Kasur	16,793	1	...	231	61	...	...
	GUJRANWALA DISTRICT.							
36	Gujránwála	20,362	...	...	309	75	...	...
37	Wazirabad	15,346	...	1	293	25	...	...
	FEROZEPORE DISTRICT.							
38	Forezepore	15,168	...	2	476	40	...	...
	RAWALPINDI DISTRICT.							
39	Rawalpindi	20,802	8	...	602	244	...	...
	JHELUM DISTRICT.							
40	Jhelum	11,319	1	1	168	61	...	...
41	Pind Dádan Khan	15,397	...	4	181	92	...	...
	GUJRAT DISTRICT.							
42	Gujrát	17,401	...	...	150	48	...	...
43	Jalálpur	14,014	...	...	231	35	...	1
	SHAHPUR DISTRICT.							
44	Bhera	14,710	...	...	183	57	...	...
	MOOLTAN DISTRICT.							
45	Mooltan	29,448	...	...	333	134	1	...
46	Do. Suburbs	21,430	...	...	328	67	...	...
	JHANG DISTRICT.							
47	Maghiána	13,618	...	...	117	15	...	...
48	Chiniot	11,999	...	...	76	28	...	...
	DERA ISMAIL KHAN DISTRICT.							
49	Dera Ismail Khan	19,954	...	120	268	38	...	...
	DERA GHAZI KHAN DISTRICT.							
50	Dera Gházi Khan	19,133	...	49	267	28	...	...
	PESHAWAR DISTRICT.							
51	Pesháwar	58,430	118	49	1,318	276	...	...
	KOHAT DISTRICT.							
52	Kohát	11,043	...	7	160	92	...	...
	Total of the Towns ...	1,299,686	137	308	22,631	3,969	10	10
	Total for the Province ...	17,487,125	274	9,145	327,727	20,736	132	154

Note.—The deaths registered in the Frontier Cantonments and Hill Sanitaria are shown separately

DISTRICTS and TOWNS of the PUNJAB during the year 1880.

8			9	10	11								12
RIES.					RATIO OF DEATHS PER 1,000 OF POPULATION.								
											From all causes.		
Wounds or accidents.	Snake-bite or killed by wild beasts.	Total.	All other causes.	Total deaths from all causes.	Cholera.	Small-pox.	Fevers.	Bowel complaints.	Injuries.	All other causes.	For the year.	Mean of previous five years.	Number.
32	3	39	1,185	4,771	...	0·01	29·67	0·90	0·34	10·22	41	66	1
9	1	10	232	1,157	...	...	19·61	0·92	0·22	5·21	26	45	2
3	1	4	57	302	...	...	16·20	1·47	0·30	4·18	22	30	3
8	...	8	100	371	...	...	18·78	6·04	0·75	9·44	35	76	4
10	1	11	187	672	...	0·16	14·37	4·29	0·44	7·42	27	54	5
8	1	9	108	322	...	...	17·00	2·47	0·85	10·26	30	72	6
4	1	5	119	420	...	...	15·27	6·57	0·37	8·78	31	87	7
7	...	7	429	1,083	...	0·79	20·53	5·62	0·29	17·86	45	62	8
3	...	3	77	347	...	...	13·35	3·54	0·19	4·87	22	29	9
5	...	5	261	748	0·04	0·33	15·14	4·16	0·20	10·65	30	38	10
5	...	5	157	362	...	...	11·93	2·19	0·35	11·09	25	48	11
2	1	3	90	301	...	...	14·90	2·13	0·24	7·37	25	41	12
7	1	8	309	753	0·03	0·27	10·47	2·35	0·24	9·30	23	37	13
2	...	3	119	304	...	...	10·34	1·80	0·20	7·94	20	40	14
...	...	...	80	251	...	0·08	10·60	3·05	...	6·42	20	42	15
4	1	5	90	213	...	...	7·42	1·80	0·39	7·03	17	43	16
6	...	6	316	866	...	0·08	14·32	6·32	0·23	12·03	33	44	17
1	1	2	160	346	...	0·24	11·50	2·95	0·16	12·78	28	36	18
...	...	...	68	278	...	0·77	15·35	1·89	...	5·83	24	30	19
...	...	...	52	250	...	0·18	17·46	0·09	...	4·66	22	35	20
6	...	6	112	272	0·10	0·10	12·86	1·95	0·58	10·91	26	35	21
14	2	16	472	1,455	0·02	0·12	21·39	2·40	0·40	11·69	36	57	22
6	6	13	291	543	...	...	9·43	5·21	0·80	17·83	33	51	23
3	...	3	368	975	...	...	14·76	2·38	0·08	10·45	28	69	24
3	...	3	92	349	...	0·06	14·58	1·53	0·19	5·86	22	63	25
2	...	2	25	234	...	0·09	18·46	0·18	0·18	2·26	21	59	26
1	...	1	107	498	...	...	25·55	4·65	0·08	8·28	38	35	27
6	...	7	175	425	...	...	11·04	7·46	0·53	13·32	32	50	28
2	...	2	120	424	...	...	17·61	4·01	0·14	8·59	30	56	29
50	3	59	2,243	5,260	0·01	0·01	18·65	3·06	0·43	16·47	39	65	30
9	...	9	138	356	...	0·04	6·76	0·96	0·33	5·12	13	33	31
6	1	7	364	802	...	...	9·43	3·64	0·21	11·03	24	35	32
21	2	25	638	2,724	0·03	0·08	21·49	0·79	0·27	6·93	29	49	33
11	...	14	434	1,218	0·03	...	15·71	5·41	0·38	11·92	33	29	34
3	...	3	110	406	0·06	...	13·75	3·63	0·18	6·55	24	29	35
9	1	10	256	650	...	...	15·17	3·68	0·49	12·57	32	43	36
3	...	3	83	405	...	0·06	19·09	1·63	0·19	5·41	26	38	37
6	...	6	215	739	...	0·13	31·38	2·64	0·39	14·17	49	60	38
13	1	14	404	1,272	0·38	...	28·94	11·73	0·67	19·42	61	72	39
1	...	1	68	300	0·09	0·09	14·84	5·39	0·09	6·01	26	40	40
2	1	3	166	446	...	0·26	11·75	5·97	0·19	10·78	29	40	41
2	...	2	151	351	...	...	8·62	2·76	0·11	8·68	20	33	42
2	...	3	152	421	...	...	16·48	2·50	0·21	10·85	30	41	43
10	3	13	266	519	...	...	12·44	3·87	0·88	18·08	35	36	44
18	2	21	505	993	...	...	11·31	4·55	0·71	17·15	34	35	45
12	2	14	344	753	...	...	15·30	3·13	0·65	16·05	35	45	46
2	...	2	147	281	...	...	8·59	1·10	0·15	10·79	21	29	47
3	...	3	192	299	...	...	6·33	2·33	0·25	16·00	25	29	48
3	1	4	140	570	...	0·01	13·43	1·90	0·20	7·02	28	30	49
5	...	5	187	536	...	2·56	13·95	1·46	0·26	9·77	28	40	50
30	1	31	832	2,624	2·02	0·84	22·56	4·72	0·53	14·24	45	59	51
2	2	4	105	368	...	0·63	14·49	8·33	0·36	9·51	33	24	52
382	40	442	14,098	41,585	0·10	0·24	17·41	3·05	0·34	10·85	32	48	
4,129	1,142	5,557	109,292	472,731	0·01	0·52	18·74	1·18	0·32	6·25	27	29	

in Form No. VI B, but are included in the grand total for the Province;

ANNUAL FORM No. VI B.

DEATHS REGISTERED in the FRONTIER CANTONMENTS and HILL SANITARIA during the year 1880.

Number.	Frontier Cantonments and Hill Sanitaria.	Population.	Cholera.	Small-pox.	Fevers.	Bowel complaints.	Injuries.					All other causes.	Total deaths from all causes.	Ratio of deaths per 1,000 of population.	Total births registered during the year.	Ratio of births per 1,000 of population.
							Suicide.		Wounds or accidents.	Snake-bite or killed by wild beasts.	Total.					
							Males.	Females.								
	Frontier Cantonments.															
1	Abbott-abad ...	2,894	1	...	10	5	...	...	...	...	...	20	36	12	23	8
2	Mardan ...	1,964	...	...	18	3	...	...	2	...	2	14	37	19	18	9
3	Kohát ...	5,210	...	...	16	15	...	...	1	...	1	50	82	25	1	...
4	Edwardes-abad ...	3,224	...	1	42	21	...	1	...	...	1	81	146	45	15	5
5	Dera Ismail Khan ...	5,331	...	1	15	5	2	...	2	1	5	43	69	21	22	4
6	Dera Gházi Khan ...	2,937	...	1	10	12	...	...	2	...	2	34	59	20	2	1
7	Rájanpur ...	1,138	...	...	1	1	...	...	...	...	...	4	6	5	...	...
	Hill Sanitaria.															
1	Simla ...	17,440	...	...	153	27	1	...	6	...	7	99	286	16	77	4
2	Dharmsála ...	2,862	...	1	51	35	1	...	2	...	3	26	116	40	55	19
3	Dalhousie ...	2,255	...	...	3	3	...	1	2	...	3	11	20	9	6	3
4	Murree ...	7,939	...	...	36	6	...	...	1	...	1	16	59	7	22	3
	Total ...	53,194	1	4	355	133	4	2	18	1	25	398	916	17	241	4

ANNUAL FORM No. VII.

DEATHS REGISTERED from CHOLERA in the DISTRICTS of the PUNJAB during each month of the year 1880.

1	2	3		4		5												6			7			8	9
		Circles of registration.		*Villages.*														*Total.*			*Ratio of deaths per 1,000 of population.*				
Number.	DISTRICTS.	Number in each district.	Number from which deaths from Cholera were reported.	Number in each district.	Number from which deaths from Cholera were reported.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Males.	Females.	Total.	Males.	Females.	Total.	Mean ratio per 1,000 of previous 5 years.	Number.
	DELHI DIVN.																								
1	Delhi ...	15	2	743	2	...	...	...	...	...	2	...	...	...	...	...	...	2	...	2	0·01	...	0·003	0·24	1
2	Gurgaon ...	16	2	1,239	2	...	...	1	1	...	...	...	...	...	...	...	...	1	1	2	0·002	0·002	0·002	0·42	2
3	Karnál ...	14	1	868	1	...	...	...	1	...	...	...	...	...	...	...	...	1	...	1	0·003	...	0·001	0·55	3
	HISSAR DIVN.																								
4	Hissar ...	13	2	715	2	...	...	...	...	1	1	...	...	...	...	...	...	1	1	2	0·003	0·004	0·004	1·57	4
5	Rohtak ...	11	3	498	3	...	...	2	...	1	...	...	...	...	...	...	...	1	2	3	0·003	0·01	0·005	0·85	5
6	Sirsa ...	13	2	626	2	...	...	...	...	...	1	...	...	...	...	1	...	2	...	2	0·02	...	0·01	1·06	6
	UMBALLA DIVN.																								
7	Umballa ...	20	5	2,225	6	1	1	...	1	1	...	1	...	...	1	...	...	4	2	6	0·01	0·004	0·005	0·19	7
8	Ludhiána ...	10	3	851	3	...	...	...	...	1	1	1	...	...	...	...	...	3	...	3	0·01	...	0·005	1·02	8
9	Simla ...	4	1	238	1	...	...	...	1	...	...	...	...	...	...	...	...	1	...	1	0·04	...	0·03	1·58	9
	JULLUNDUR DIVISION.																								
10	Jullundur ...	9	...	1,233	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0·38	10
11	Hoshiárpur ...	14	1	2,178	1	...	...	...	...	...	...	...	...	1	...	...	...	1	...	1	0·001	...	0·001	0·07	11
12	Kángra ...	15	2	704	2	...	...	1	...	...	...	...	...	...	1	...	...	1	1	2	0·002	0·002	0·002	0·74	12
	AMRITSAR DIVISION.																								
13	Amritsar ...	10	3	1,078	3	...	1	...	...	...	...	1	...	1	...	...	...	1	2	3	0·002	0·005	0·003	0·52	13
14	Gurdáspur ...	17	6	2,302	6	...	1	1	...	...	1	1	1	...	...	...	1	2	4	6	0·003	0·009	0·006	0·34	14
15	Siálkot ...	13	1	2,315	1	...	...	...	...	...	...	...	...	...	1	...	...	1	...	1	0·001	...	0·001	0·16	15
	LAHORE DIVN.																								
16	Lahore ...	20	8	1,672	10	...	...	...	4	1	2	1	...	...	5	...	1	9	5	14	0·02	0·01	0·02	0·69	16
17	Gujránwála ...	9	1	1,177	1	...	...	...	...	...	...	...	...	...	...	...	1	1	...	1	0·003	...	0·001	0·26	17
18	Ferozepore ...	15	2	1,276	2	...	...	...	...	...	1	...	...	...	1	...	...	2	...	2	0·06	...	0·003	0·73	18
	RAWALPINDI DIVISION.																								
19	Rawalpindi ...	18	5	1,725	8	...	...	1	...	1	1	...	1	4	20	3	...	30	1	31	0·08	...	0·04	1·01	19
20	Jhelum ...	13	3	1,042	7	...	...	...	...	...	3	1	1	...	2	...	...	4	3	7	0·01	0·01	0·01	0·90	20
21	Gujrat ...	8	3	1,416	4	...	...	...	...	1	...	...	...	...	6	...	...	7	...	7	0·02	...	0·01	0·31	21
22	Shahpur ...	15	1	632	1	...	...	...	...	...	1	...	...	...	...	...	...	1	...	1	0·005	...	0·002	0·37	22
	MOOLTAN DIVN.																								
23	Mooltan ...	12	...	1,233	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0·01	23
24	Jhang ...	9	...	976	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0·14	24
25	Montgomery ...	16	...	1,518	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0·06	25
26	Muzaffargarh ...	12	1	534	1	...	...	...	...	...	...	...	...	...	1	...	...	1	...	1	0·01	...	0·003	...	26
	DERAJAT DIVN.																								
27	Dera Ismail Khan ...	19	...	772	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0·14	27
28	Dera Gházi Khan ...	17	...	422	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	28
29	Bannu ...	13	1	553	1	...	...	...	...	...	...	...	...	...	3	...	...	1	2	3	0·01	0·01	0·01	0·81	29
	PESHAWAR DIVISION.																								
30	Peshâwar ...	19	11	730	19	...	...	...	1	...	1	1	30	7	76	51	...	119	48	167	0·44	0·21	0·33	0·65	30
31	Hazára ...	16	3	1,013	5	...	...	...	...	...	...	1	...	1	3	...	...	4	1	5	0·02	...	0·01	0·56	31
32	Kohát ...	11	...	469	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0·91	32
	Total for the Province ...	436	73	34,973	94	1	3	6	9	7	15	8	33	14	120	55	3	201	73	274	0·02	0·01	0·01	0·44	

DEATHS REGISTERED from SMALL-POX in the DISTRICTS of the

1	2	3		4		5					
		Circles of registration.		*Villages.*							
Number.	Districts.	Number in each district.	Number from which deaths from Small-pox were reported.	Number in each district.	Number from which deaths from Small-pox were reported.	January.	February.	March.	April.	May.	June.
	DELHI DIVISION.										
1	Delhi	15	1	743	1	...	...	1	...	...	...
2	Gurgaon	16	4	1,239	5	...	...	2		...	6
3	Karnál	14	14	868	225	17	25	13	44	53	89
	HISSAR DIVISION.										
4	Hissar	13	8	715	16	...	2	...	5	11	5
5	Rohtak	11	9	498	11	1	...	...	1	...	5
6	Sirsa	13	12	626	23	...	...	1	2	6	6
	UMBALLA DIVISION.										
7	Umballa	20	19	2,225	281	21	19	19	29	30	67
8	Ludhiána	10	10	851	33	15	3	3	10	3	2
9	Simla	4	...	238	...	...	...	...	...	...	...
	JULLUNDUR DIVISION.										
10	Jullundur	9	9	1,233	103	45	41	24	25	23	20
11	Hoshiárpur	14	14	2,178	240	69	44	44	42	40	79
12	Kángra	15	7	704	58	3	5	6	2	10	1
	AMRITSAR DIVISION.										
13	Amritsar	10	6	1,078	29	3	6	14	3	4	8
14	Gurdáspur	17	11	2,302	37	10	7	8	8	12	22
15	Siálkot	13	13	2,315	40	1	2	4	1	5	4
	LAHORE DIVISION.										
16	Lahore	20	20	1,672	107	21	29	19	18	17	18
17	Gujránwála	9	8	1,177	49	1	6	3	3	6	15
18	Ferozepore	15	13	1,276	50	6	9	7	22	21	12
	RAWALPINDI DIVISION.										
19	Rawalpindi	18	5	1,725	19	5	2	5	2	10	10
20	Jhelum	13	10	1,042	86	22	33	55	28	10	8
21	Gujrat	8	2	1,416	7	5	1		3	4	2
22	Shahpur	15	13	632	204	166	214	185	102	49	54
	MOOLTAN DIVISION.										
23	Mooltan	12	8	1,233	76	20	9	20	14	37	19
24	Jhang	9	7	976	74	7	9	14	17	21	12
25	Montgomery	16	15	1,518	115	7	13	13	18	16	29
26	Muzaffargarh	12	12	534	221	52	107	127	119	93	95
	DERAJAT DIVISION.										
27	Dera Ismail Khan	19	19	772	340	50	99	188	269	430	355
28	Dera Gházi Khan	17	11	422	80	41	50	25	34	32	16
29	Bannu	13	13	553	201	81	118	191	171	183	162
	PESHAWAR DIVISION.										
30	Pesháwar	19	17	730	103	20	14	16	24	37	32
31	Hazára	16	4	1,013	6	1	...	...	1	...	...
32	Kohát	11	11	469	52	12	33	30	22	33	27
	Total for the Province ...	436	325	34,973	2,892	702	900	1,038	1,040	1,196	1,180

PUNJAB during each month of the year 1880.

						6			7		8			9	10
						Total.			*Number of these deaths among children.*		*Total ratio of deaths per 1,000 of population.*			Mean ratio per 1,000 of previous 5 years.	Number.
July.	August.	September.	October.	November.	December.	Males.	Females.	Total.	Under one year.	One and under twelve years.	Males.	Females.	Total.		
...	...	...	...	...	...	1	...	1	...	1	...	...	...	0·62	1
2	2	...	...	1	1	12	3	15	5	9	0·03	0·01	0·02	3·64	2
52	45	47	28	20	26	273	186	459	157	269	0·82	0·66	0·75	2·99	3
1	1	...	...	...	...	15	10	25	7	17	0·06	0·04	0·05	0·94	4
1	...	...	...	1	...	4	5	9	2	6	0·01	0·02	0·02	0·81	5
5	2	1	...	...	1	15	9	24	7	16	0·13	0·10	0·11	1·74	6
27	48	81	55	25	27	260	188	448	175	236	0·47	0·41	0·44	2·04	7
1	2	1	...	1	3	17	27	44	7	34	0·05	0·10	0·07	1·70	8
...	...	...	...	...	...	...	...	...	...	...	...	...	...	0·34	9
21	5	3	...	1	1	109	100	209	39	153	0·25	0·28	0·27	0·32	10
21	6	6	4	4	9	168	200	368	77	220	0·33	0·46	0·39	0·56	11
1	2	...	...	...	..	17	13	30	1	13	0·04	0·04	0·04	0·16	12
6	...	2	2	...	2	17	33	50	14	31	0·04	0·09	0·06	2·17	13
3	6	5	7	2	4	51	43	94	14	72	0·10	0·11	0·10	0·97	14
1	...	2	...	...	1	8	13	21	7	13	0·01	0·03	0·02	0·85	15
11	10	11	6	5	6	105	66	171	26	135	0·24	0·19	0·22	2·40	16
3	3	3	6	12	3	39	25	64	10	52	0·13	0·10	0·12	1·42	17
3	6	...	1	5	2	48	46	94	12	77	0·16	0·19	0·18	1·50	18
4	7	4	11	18	23	51	50	101	28	67	0·13	0·15	0·14	1·26	19
4	2	2	2	1	1	80	88	168	52	109	0·30	0·37	0·33	1·07	20
..	...	1	...	...	4	14	7	21	9	12	0·04	0·02	0·03	1·72	21
25	1	...	...	2	1	413	386	799	194	590	2·11	2·23	2·17	1·47	22
28	20	14	4	7	11	102	101	203	31	150	0·40	0·49	0·44	1·29	23
6	2	1	1	9	5	60	44	104	17	80	0·31	0·28	0·30	1·35	24
21	29	17	10	3	9	90	95	185	31	122	0·45	0·59	0·51	3·01	25
62	57	26	18	42	57	427	428	855	136	627	2·63	3·21	2·89	1·56	26
213	101	49	49	78	193	1,114	960	2,074	315	1,544	5·24	5·27	5·25	1·32	27
20	8	2	5	8	13	146	108	254	33	200	0·85	0·78	0·82	0·94	28
114	66	51	72	152	19	802	757	1,559	264	1,183	5·20	5·67	5·42	1·88	29
49	19	27	22	61	125	248	198	446	77	347	0·93	0·85	0·89	1·46	30
...	...	...	...	1	1	4	...	4	1	3	0·02	...	0·01	1·04	31
12	19	9	9	13	27	113	133	246	34	191	1·42	2·01	1·69	0·84	32
717	469	365	312	472	754	4,823	4,322	9,145	1,782	6,579	0·51	0·54	0·52	1·44	

DEATHS REGISTERED from FEVERS in the DISTRICTS of

1	2	3		4		5				
		Circles of registration.		*Villages.*						
Number.	Districts.	Number in each district.	Number from which deaths from fevers were reported.	Number in each district.	Number from which deaths from fevers were reported.	January.	February.	March.	April.	May.
	DELHI DIVISION.									
1	Delhi	15	15	743	660	2,308	1,408	1,238	1,125	1,441
2	Gurgaon	16	16	1,239	1,085	2,815	1,372	1,042	884	1,017
3	Karnál	14	14	868	824	2,431	1,416	1,205	1,264	1,312
	HISSAR DIVISION.									
4	Hissar	13	13	715	636	529	524	518	558	772
5	Rohtak	11	11	498	415	1,705	848	996	773	1,093
6	Sirsa	13	13	626	512	323	313	294	261	288
	UMBALLA DIVISION.									
7	Umballa	20	20	2,225	2,012	2,771	1,690	1,610	1,301	1,684
8	Ludhiána	10	10	851	796	879	487	500	639	560
9	Simla	4	4	238	71	25	15	21	17	26
	JULLUNDUR DIVISION.									
10	Jullundur	9	9	1,233	1,117	1,732	1,114	1,048	994	998
11	Hoshiárpur	14	14	2,178	1,887	1,634	1,201	1,041	986	1,046
12	Kángra	15	15	704	668	1,020	931	861	826	1,221
	AMRITSAR DIVISION.									
13	Amritsar	10	10	1,078	976	1,201	844	798	762	1,000
14	Gurdáspur	17	17	2,302	1,959	1,863	1,309	985	838	1,256
15	Siálkot	13	13	2,315	1,946	1,287	939	814	755	987
	LAHORE DIVISION.									
16	Lahore	20	20	1,672	1,369	1,392	1,088	881	849	1,117
17	Gujránwála	9	9	1,177	1,056	914	647	620	556	753
18	Ferozepore	15	15	1,276	1,116	524	514	566	466	497
	RAWALPINDI DIVISION.									
19	Rawalpindi	18	18	1,725	1,563	2,440	1,695	1,218	1,014	1,199
20	Jhelum	13	13	1,042	913	926	763	649	500	613
21	Gujrat	8	8	1,416	1,262	1,044	764	617	587	887
22	Shahpur	15	15	632	532	452	425	399	386	338
	MOOLTAN DIVISION.									
23	Mooltan	12	12	1,233	891	921	760	634	536	739
24	Jhang	9	9	976	601	237	366	320	233	308
25	Montgomery	16	16	1,518	932	554	445	346	254	385
26	Muzaffargarh	12	12	534	513	607	568	627	422	481
	DERAJAT DIVISION.									
27	Dera Ismail Khan	19	19	772	531	856	642	517	392	538
28	Dera Gházi Khan	17	17	422	301	475	473	406	349	396
29	Bannu	13	13	553	373	434	379	357	295	320
	PESHAWAR DIVISION.									
30	Peshâwar	19	19	730	502	712	531	464	382	495
31	Hazára	16	14	1,013	692	517	398	323	303	478
32	Kohát	11	11	469	247	153	185	116	87	91
	Total for the Province	436	434	34,973	28,958	35,681	25,054	22,031	19,594	24,336

FORM No. IX.

the PUNJAB during each month of the year 1880.

							6			7			8	9
							Total.			*Total ratio of deaths per 1,000 of population.*			Mean ratio per 1,000 for previous 5 years.	Number.
June.	July.	August.	September.	October.	November.	December.	Males.	Females.	Total.	Males.	Females.	Total.		
1,485	879	865	947	1,074	1,378	1,429	8,557	7,020	15,577	26·22	24·84	25·58	27·92	1
1,264	682	721	754	963	927	995	7,785	5,651	13,436	21·03	17·31	19·28	29·97	2
1,427	937	1,061	1,417	1,576	1,395	1,576	9,512	7,505	17,017	28·76	26·79	27·85	20·94	3
743	455	676	588	543	595	581	3,970	3,112	7,082	14·88	14·29	14·61	14·71	4
1,097	657	718	851	956	1,006	888	6,769	4,819	11,588	23·15	19·70	21·58	26·00	5
295	201	233	199	228	216	223	1,680	1,394	3,074	14·35	14·87	14·58	15·23	6
1,696	1,126	1,439	2,130	2,769	2,058	1,795	12,333	9,736	22,069	22·40	21·24	21·87	16·94	7
778	569	791	1,599	1,463	1,193	931	5,584	4,805	10,389	17·48	18·21	17·81	19 39	8
31	24	25	38	47	19	26	176	138	314	7·96	12·03	9·35	7·17	9
991	751	1,050	1,635	1,595	1,495	1,434	8,039	6,798	14,837	18·73	19·21	18·95	35·82	10
1,354	800	1,278	2,742	2,349	2,003	1,682	9,570	8,546	18,116	18·97	19·67	19·29	25·32	11
1,415	945	1,337	2,210	1,958	1,459	1,254	8,089	7,348	15,437	20·56	20·98	20·75	14·97	12
1,204	856	1,194	1,566	1,706	1,810	1,680	7,911	6,710	14,621	17·01	18·25	17·56	24·56	13
1,286	997	1,317	2,180	2,582	1,721	1,563	9,546	8,351	17,897	19·04	20·62	19·75	23·13	14
1,073	854	1,255	2,065	2,120	1,782	1,429	8,332	7,028	15,360	15·47	15·42	15·44	18·71	15
1,129	860	1,321	1,614	1,644	1,785	1,901	8,500	7,081	15,581	19·85	20·39	20·09	23·25	16
908	771	1,047	1,169	1,163	1,071	1,099	5,706	5,012	10,718	18·63	20·52	19 47	22·69	17
662	425	709	937	1,102	955	857	4,683	3,531	8,214	15·95	14·72	15·40	17·84	18
1,206	1,068	1,313	1,556	1,811	1,852	1,944	10,089	8,227	18,316	26·78	25·47	26·18	22·98	19
777	588	762	954	1,083	925	1,005	5,133	4,412	9,545	19·39	18·67	19·05	15·84	20
918	913	966	1,308	1,517	1,229	1,031	6,195	5,586	11,781	18·66	19·64	19·11	15·44	21
530	391	431	396	474	365	512	2,663	2,436	5,099	13·60	14·08	13·83	13·88	22
506	467	423	469	785	740	1,050	4,519	3,511	8,030	17·88	16·96	17·46	18·40	23
312	256	290	275	272	324	396	2,046	1,543	3,589	10·57	9·99	10·31	8·17	24
368	243	371	380	437	495	583	2,716	2,145	4,861	13·58	13·45	13·52	16·59	25
416	283	277	450	583	684	823	3,468	2,753	6,221	21·39	20·63	21·05	19·89	26
533	440	425	395	531	557	645	3,563	2,908	6,471	16·75	15·97	16·39	15·40	27
276	296	262	268	294	319	347	2,435	1,726	4,161	14·22	12·44	13·42	10·92	28
356	310	299	348	530	507	626	2,652	2,109	4,761	17·21	15·80	16·56	11·74	29
391	365	308	469	840	830	865	3,697	2,955	6,652	13·81	12·69	13·29	10·77	30
371	322	411	452	576	443	565	2,812	2,347	5,159	14·69	13·35	14·05	13·68	31
104	121	93	140	191	235	238	1,027	727	1,754	12·95	11·00	12·06	7·40	32
25,902	18,852	23,668	32,501	35,762	32,373	31,973	179,757	147,970	327,727	18·90	18·55	18·74	20·17	

DEATHS REGISTERED from BOWEL COMPLAINTS in the

1	2	3		4		5				
Number.	DISTRICTS.	*Circles of registration.*		*Villages.*						
		No. in each district.	No. from which deaths from bowel complaints were reported.	No. in each district.	No. from which deaths from bowel complaints were reported.	January.	February.	March.	April.	May.
	DELHI DIVISION.									
1	Delhi	15	13	743	229	153	58	31	44	54
2	Gurgaon	16	14	1,239	218	152	60	56	48	60
3	Karnál	14	14	868	299	95	54	29	41	35
	HISSAR DIVISION.									
4	Hissar	13	11	715	127	27	17	21	20	20
5	Rohtak	11	10	498	70	48	26	21	22	24
6	Sirsa	13	13	626	125	19	4	15	13	18
	UMBALLA DIVISION.									
7	Umballa	20	20	2,225	740	209	119	85	79	111
8	Ludhiána	10	10	851	258	28	22	31	31	24
9	Simla	4	4	238	66	12	6	10	6	14
	JULLUNDUR DIVISION.									
10	Jullundur	9	8	1,233	182	21	16	16	17	17
11	Hoshiárpur	14	14	2,178	890	97	79	91	120	141
12	Kángra	15	14	704	509	86	84	118	157	336
	AMRITSAR DIVISION.									
13	Amritsar	10	10	1,078	300	65	53	61	39	55
14	Gurdáspur	17	17	2,302	402	72	51	35	44	73
15	Siálkot	13	13	2,315	358	53	21	29	42	52
	LAHORE DIVISION.									
16	Lahore	20	20	1,672	373	62	50	36	36	55
17	Gujránwála	9	9	1,177	180	37	26	23	20	40
18	Ferozepore	15	13	1,276	166	13	14	25	29	31
	RAWALPINDI DIVISION.									
19	Rawalpindi	18	18	1,725	150	85	66	54	45	53
20	Jhelum	13	12	1,042	148	77	59	46	42	49
21	Gujrat	8	7	1,416	215	38	38	28	32	45
22	Shahpur	15	15	632	197	32	34	27	60	62
	MOOLTAN DIVISION.									
23	Mooltan	12	7	1,233	54	27	18	10	24	17
24	Jhang	9	8	976	108	7	5	10	10	22
25	Montgomery	16	16	1,518	177	19	10	9	8	15
26	Muzaffargarh	12	12	534	28	4	3	7	14	13
	DERAJAT DIVISION.									
27	Dera Ismail Khan	19	16	772	60	14	8	8	14	21
28	Dera Ghází Khan	17	11	422	32	21	9	1	5	7
29	Bannu	13	13	553	104	27	16	20	15	31
	PESHAWAR DIVISION.									
30	Pesháwar	19	16	730	87	47	28	29	21	39
31	Hazára	16	12	1,013	67	12	8	9	15	12
32	Kohát	11	7	469	11	15	16	6	7	2
	Total of the Province ...	436	397	34,973	6,930	1,674	1,078	997	1,120	1,548

No. X.

DISTRICTS of the PUNJAB during each MONTH of the year 1880.

							6			7			8	9
							Total.			*Ratio of deaths per* 1,000 *of population.*			Mean ratio per 1,000 for previous five years.	Number.
June.	July.	August.	September.	October.	November.	December.	Males.	Females.	Total.	Males.	Females.	Total.		
55	57	92	80	101	60	58	532	311	843	1·63	1·10	1·38	2·60	1
25	40	72	64	70	55	38	417	323	740	1·13	0·99	1·06	3·50	2
80	69	82	104	88	73	73	512	311	823	1·55	1·11	1·35	1·87	3
31	25	46	22	37	26	20	191	121	312	0·71	0·55	0·64	1·03	4
21	23	26	31	37	27	30	215	121	336	0·73	0·49	0·62	1·03	5
15	12	15	13	9	16	9	106	52	158	0·90	0·55	0·75	1·32	6
97	99	150	204	307	210	119	1,134	655	1,789	2·06	1·43	1·77	2·10	7
21	21	60	110	101	69	51	353	216	569	1·10	0·82	0·97	1·71	8
14	21	22	17	10	14	6	83	69	152	3·75	6·01	4·52	2·87	9
13	16	43	78	61	41	46	236	149	385	0·55	0·42	0·49	1·12	10
87	73	135	298	235	138	100	892	702	1,594	1·77	1·61	1·70	3·21	11
268	247	319	591	373	223	190	1,639	1,353	2,992	4·16	3·86	4·02	2·49	12
53	42	67	118	119	97	85	573	281	854	1·23	0·76	1·02	1·80	13
62	60	95	218	260	143	75	712	476	1,188	1 42	1·17	1·31	2 11	14
49	41	76	147	160	88	69	547	280	827	1·01	0·61	0.83	1·10	15
39	38	85	74	91	92	94	532	220	752	1·24	0·63	0·97	1·06	16
40	24	59	68	51	43	45	312	164	476	1·02	0·67	0·86	0·88	17
16	13	26	21	42	33	19	186	96	282	0·63	0·40	0·53	0·97	18
66	59	104	118	161	142	154	755	352	1,107	2·00	1·09	1·58	1·14	19
56	83	111	127	130	81	91	593	359	952	2·24	1·52	1·90	1·49	20
39	49	72	101	113	71	26	395	257	652	1·19	0·90	1·06	0·79	21
56	54	83	69	60	50	48	366	269	635	1 87	1·55	1·72	1.42	22
28	49	48	45	48	34	39	235	152	387	0·93	0·73	0·84	1·02	23
25	20	16	16	15	17	28	125	66	191	0·64	0·43	0·55	0·51	24
6	7	17	7	15	12	15	95	45	140	0 47	0·28	0·39	0·56	25
4	5	3	6	5	12	10	56	30	86	0·34	0·22	0·29	0·28	26
7	23	23	34	28	29	15	115	109	224	0·54	0·60	0·57	0·56	27
9	7	10	12	11	14	8	71	43	114	0·41	0·31	0·37	0·61	28
26	27	50	33	45	40	44	215	159	374	1·39	1·19	1·30	1'08	29
28	31	37	54	51	44	37	317	129	446	1·18	0·55	0·89	0.82	30
21	23	15	26	21	19	15	118	78	196	0·62	0·44	0·53	1·01	31
6	14	9	19	18	27	21	132	28	160	1·66	0·42	1·10	0·50	32
1,363	1,372	2,068	2,925	2,873	2,040	1,678	12,760	7,976	20,736	1·34	1·00	1·18	1·53	

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REPORT

ON THE

SANITARY ADMINISTRATION

OF THE

PUNJAB

FOR THE YEAR 1880.

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